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ABSTRACT

This document, the fourth volume in a series, details a process for linking vocational education and training (VET) standards and employment requirements that was developed in the United Kingdom and based on functional analysis. The introductory sections describe the other three manuals in the series and the process used to develop this manual. The following are among the topics discussed in sections 1 through 5: (1) an international perspective on efforts to meet labor market needs through VET (the purpose of VET, how the VET system responds to change, roles in development of VET standards, embedding changes in VET standards, gathering information about economic change); (2) functional activity and describing work activity (describing behavior, task analysis, functional mapping, iteration); (3) VET standards (standards for the modern economy, new employment requirements for skilled workers, performance requirements); (4) standards, overarching requirements, and levels (completing VET standards, increasing/reducing levels of VET standards); and (5) evaluating VET standards (policy, technical, and implementation criteria and an evaluation framework for VET standards). Twenty-seven figures are included. The following items are appended: an example "technical" module; an example "overarching" module; guidelines for tracking types and impacts of economic change; a list of verbs used in the titles of VET standards; and example functional maps and modules. (MN)

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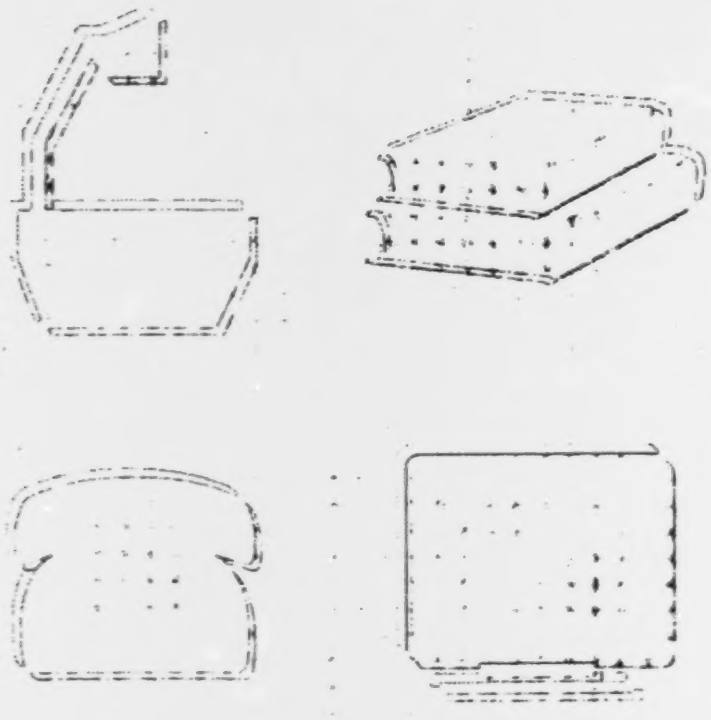
Linking Vocational Education and Training Standards and Employment Requirements

An International Manual



Prepared for the European Training Foundation
(as part of their series of manuals on the development of vocational education and training standards)

by

Bob Mansfield
PRIME Research and Development Ltd

With contributions
by
Hermann Schmidt

February 2001

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The European Training Foundation is an agency of the European Union which works in the field of vocational education and training in Central and Eastern Europe, the New Independent States, Mongolia and the Mediterranean partner countries and territories. The Foundation also provides technical assistance to the European Commission for the Tempus Programme.

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Foreword and Introduction

Since its establishment the European Training Foundation has been involved in supporting Central and Eastern European Countries as well as the New Independent States and Mongolia in reforming their vocational education and training systems in general and in developing new vocational education and training standards in particular. The main activities to support the partner countries in developing new vocational education and training standards have been the following:

- Subgroup C of the European Training Foundation Advisory Forum has been working since 1995 on the definition, development, and implementation of 'vocational education and training standards'. The Subgroup has developed a common understanding of what a vocational education and training standard should be, and issued guidance on implementation. In 1996, the Subgroup developed a "Standard Development Model Scheme", to be used as a check list to initiate and implement vocational education and training standards.
- In 1997 the European Training Foundation launched a pilot project to further support the partner countries in their discussions on standard development. The purpose of the pilot project was to develop, for one or two occupations, a 'model standard' following the "Standard Development Model", and to train key practitioners in the participating countries on how best reform their vocational education and training standards system.
- In 1998 a training workshop for vocational education and training key players in the New Independent States was held on the topic of vocational education and training standards development and implementation, including case studies on vocational education and training standards development in France, Ireland, the United Kingdom and Germany.
- Between June 1999 and April 2000 the European Training Foundation funded and managed the "Standards 2000" project on vocational education and training standard development by: disseminating information and best practice examples in the field of vocational education and training standards, discussing different approaches and methodologies, analysing specific demands, mapping ongoing activities, and making recommendations for further improvement. During the project a number of European based methods were tested by the partner countries to improve the effectiveness of identifying labour market needs and defining the requirements of employment. This resulted in a proposal for an international framework for defining vocational education and training standards, which involves the separation of the requirements of employment (the labour market), learning and assessment.

One conclusion of the "Standards 2000" project was that the weakest link in this formula is the *identification and specification of the employment requirements*. To support the partner countries, a modification of the UK method of functional analysis was piloted. This was combined with a number of methods designed to identify future labour market needs.

Four of the teams used this method with mixed success. It was concluded that the approach was extremely valuable, but so unfamiliar to the local experts that additional development support would be needed beyond the remit of the project. The project participants proposed the development of a Manual on the analysis method and a programme of formal training and development in methods for identifying the employment requirement.

This Manual is part of the development support offered by the European Training Foundation.

An Overview

Four volumes on the development and use of standards

The European Training Foundation has been working on the subject of vocational education and training standards (English 'National Occupational Standards'/ French 'Référentiels professionnels', German 'Ausbildungsordnungen' and Russian 'профессиональные стандарты') since 1995. Vocational education and training standards differ from country to country. In the past the vocational education and training standard was the curriculum, the specification of what was taught in vocational schools, but that has changed...

Although seemingly a rather technical topic to outsiders, internationally standards are increasingly recognised as the instrument to benchmark performance of trainees and students against what they should be able to do once in employment. More and more employers all over the world are actively involved in setting occupational standards, and recently the development of occupational standards has started in the United States, where there had always been some scepticism about the use of standards.

Standards are economically and educationally important, because they are the prime instrument to ensure relevance, transparency and quality of the outcomes of the education and training process.

The European Training Foundation has been working for five years on the issue of standards with experts from most partner countries and member states. During these five years, the discussions have evolved and this is demonstrated in the four volumes that the European Training Foundation has published on the issue of standards. The Foundation's project on standards is now coming to an end.

With the Foundation's manuals, experts working on standards will be able to design vocational education standards in a common framework, improving transparency and relevance. Nevertheless, there is a need to continue the work done, especially in the area of quality. This paper tries to give a concise overview of what has been achieved with the four manuals on the subject.

Volume I

Volume I presents the results of the discussions in the European Training Foundation's Advisory Forum in the period from 1995 to 1997. The Advisory Forum Members agreed on a common definition of standards "Standards describe work activities within the framework of an occupation, and related knowledge, skills and abilities. Standards are compulsory for those involved in vocational education and training".

The Advisory Forum members analysed four different models of standards: (1) the outcome or assessment model, (2) the occupational model, (3) the modular model and (4) the modular-occupational model, reflecting different developments and traditions in Europe.

The preference of the members of the Advisory Forum was clearly linked to the complex occupational model, which mainly reflected their own national background. A complex 'ideal' procedure and 'ideal' standards team is one in which social partners and employers are involved in the standards development process, but where educationalists still dominate.

Volume II

Volume II goes deeper into the issue as to what a standard actually is and tries to come to a common understanding which could stimulate an international dialogue and further development.

More emphasis is put on the link between education and the world of work. A new term is introduced, 'the qualification standard', stressing the importance that vocational education and training policy should be led by the labour market. Qualification standards are either job based, occupational, vocational or general, depending on the degree that they are adapted to the specific demands of employers or to the requirements of the education system in general. The key word is development of competence and the manual tries to explain what competence is. The curriculum design process is analysed, starting from the definition of standards, and finishing with the evaluation of the curriculum.

The attitude of partner countries to standards is explained by grouping them into three categories:

(1) pioneers introducing new vocational training concepts,

(2) consolidators who try to maintain the existing vocational training system with reduced funds, and

(3) inexperienced countries (particularly the New Independent States) which did not have any vocational training policy making bodies before.

Volume III

Volume III is fully dedicated to the relevance of standards. During the past ten years economic and labour market changes happened much faster than in previous decades. This leads to three questions:

- What are the most important changes and trends in the economy and the labour market?
- How can the vocational education and training system respond?
- Can we evaluate the relevance of the response?

Changes are economic, technical and political developments, new technological developments, linked with new rules and regulations, new markets and different customer requirements, and changes in organisational models and organisational culture.

The vocational education and training system may respond in a reactive way, (i.e. by developing short courses to fill immediate skill gaps), in a responsive way (managing the changes within the system, by developing new standards, curricula etc), or in a strategic way (anticipating changes in advance). There are different ways to evaluate whether the response is relevant, but unfortunately there is no systematic analysis. The response of the vocational education and training system can be summarised in nine trends, describing a more open and flexible vocational training system, in which labour market inputs are integrated.

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Labour market forecasting has three purposes:

(1) to assess what the implications of existing trends in occupations are,

(2) what the labour market situation for certain occupations is and what changes can be expected,

(3) how policy measures will affect the level and structure of employment.

Different methods have been used in different OECD and Central European countries, which are described briefly in the manual.

The general conclusion is that labour market forecasts can provide quite useful information for individuals and policy makers, related to specific sectors and occupations. Only occupational analysis provides sufficiently specific information for training and education requirements.

PRIME Research and Development/ European Training Foundation volume

Following the first three volumes analysing the function of standards and how we can make them more relevant, it is not surprising that the fourth volume goes further and offers a model on how to make an international vocational education and training standard, which can be used in any vocational education and training system.

The framework for the international vocational education standard is based on experience from different OECD countries. The model is flexible and labour market driven and is tested in a number of New Independent States in the framework of the European Training Foundation's "Standards 2000" project.

The proposed model offers a common framework for standards development and will thus also help to promote international transparency. "The International Vocational Education Standard" comprises three components that every modern vocational education and training standard should contain:

The employment requirements	What does the student need to be able to do in employment?
The learning requirements	What does the student need to learn to be effective in employment?
The assessment requirements	How will we know what the student has learned and is able to do in employment?

National standards may have more components, but these are the essential ones for any vocational education and training standard.

Volume four focuses on how to identify and specify the employment requirements, since this proved to be the weakest link in existing vocational education standards. Employment requirements have to be defined by or with the assistance of employers.

Modern vocational education and training standards are being used by a growing number of people, ranging from employers, economic planners, teachers, career advisors, students and parents. This means that they need to contain clear, understandable and detailed employment requirements.

The methodology used is functional analysis, which is based on what people **have to achieve** in a certain occupation, rather than what they **are doing** today. The methodology starts with identifying the key purpose for each occupation, the major functions and the individual functions, which can be described as modules. The functions are analysed independently from the technology and methods used, which makes the standard more flexible and applicable to the occupation in varying circumstances. The methods and technology used are described separately.

The manual contains a methodology about how to describe the role of a modern skilled worker in the work process and what s/he is expected to do in addition to traditional tasks. It concerns new technical competences, managing the work process, ability to work with other people, ability to optimise the work process, how to work safely and ethically according to the specific occupation. Many of these requirements apply to the work process as a whole and are therefore described as independent functions or modules.

Standards can be adapted to different levels by either making them more or less complex. Higher levels of competence are described by either (1) adding technical activities or (2) increasing management/coordination, and/or (3) increasing technical specialisation.

The manual explains how employment requirements are linked to learning requirements, which are the basis for the curriculum.

The manual also describes how existing vocational education standards can be evaluated, based on policy, technical, and implementation criteria.

Volume IV tested

The methodology for developing employment requirements was tested during a 3-day seminar for educationalists and employers from eight New Independent States in Minsk (Belarus) in September 2000. The methodology proved to be easy to learn and to apply and was considered very useful, as the following quotes from employers participating in the seminar demonstrate:

> *"For me as an employer, it is very clear that we need to introduce the conditions of the labour market in the standards. Therefore the methodology is extremely useful. (Natalia Vasilichkova - Milling plant, Kyrgyzstan)".*
>
> *"We come to one document containing employment requirements, which will be called a standard. This is what we need. We need to apply this to the newly named occupations in the list of occupations. We will discuss the outcomes with other employers. (Sholpan Dauletova -Sweets factory, Kazakhstan)".*
>
> *"We need new standards for furniture makers. They should combine the more artistic skills of the wood cutter/sculpture-maker with carpeting skills, in order to understand and produce the mechanic parts of the furniture. The skilled worker is becoming multi-skilled as was explained by the experts. We will use the methodology that we learned here to design the employment requirements" (Andrei Iurescu -Furniture producer, Moldova).*

Conclusions and follow up

The European Training Foundation standards project is coming to an end. The fourth volume is probably the last in the standards series that started with the discussions in the Advisory Forum in 1995.

The Foundation can boast some important achievements in its standards projects and through the standards publications.

- The Foundation has been able to bring experts from the EU and the partner countries together to define the purpose of standards and a common international framework to develop and modernise vocational education and training standards, through linking the labour market with education.
- There is agreement that modern vocational education standards need to be led by the labour market and flexible in order to be adaptable to rapidly changing circumstances.
- An international framework has now been defined in "The International Vocational Education Standard" containing three elements, (1) the employment requirements, (2) the learning requirements and (3) the assessment requirements.
- In the present volume a methodology has been developed and tested to define employment requirements. The methodology focuses on analysing the content of occupations, meeting future as well as current requirements.
- Social partners should lead the process of defining the needs of employment.

As stated in the introduction, standards are important because they are the prime instruments to ensure relevance, transparency and quality of the outcomes of the training process. With the Foundation manuals, experts working on standards will be able to design vocational education standards in a common framework, ensuring relevance and improving transparency.

Nevertheless, there is a need to continue the work done.

Next steps

- ***Addressing quality, evaluation and assessment in vocational education***
  The area of assessment is an area of growing importance in vocational education and training. This is not surprising, as training systems are changing and assessment is the instrument to measure quality and relevance. What is the best way to measure what people have learned? How do we know that the vocational training student is able to apply the learned knowledge, skills, and competence in employment? Who should assess the competence of students? Since the assessment requirements are an integral part of the standard, the issue of quality and assessment needs further follow up in the near future.
- ***Developing International Vocational Education and Training Standards***
  There is an increasing need to work to international – rather than purely national – standards. "The International Vocational Education and Training Standard" developed by Bob Mansfield, Hermann Schmidt and colleagues from the European Training Foundation offers a basis for international standards.

At this moment it is unclear whether the Foundation is to be involved in these developments, which are the next steps towards an international system of transparent and relevant vocational education and training standards meeting the needs of the global economy.

Arjen Deij, Programme Manager
European Training Foundation - November 2000

The Manual

The approach adopted in this manual is based on a method developed in the UK – functional analysis. This method is described in detail in 'Towards a Competence Workforce', Bob Mansfield and Lindsay Mitchell, published by Gower, November 1996.

Towards a Competent Workforce is a commentary on the system of vocational education and training in the UK. This Manual has drawn on the UK approach but modified the method substantially to make it useful to an international audience.

The Manual also contains a framework for an 'International Vocational Education and Training Standard', which was developed during the "Standards 2000" project to help the partner countries make closer links between the labour market and vocational education and training programmes. From this framework, we have also developed a specification and model for describing the 'skilled person'. I am indebted to my colleague, Hermann Schmidt, for his contribution, advice and support in this aspect of the work.

This Manual starts with a consideration of the changing labour market – the proper starting point for the examination of any vocational education and training system. The 'International Vocational Education and Training Standard' describes the requirements of the labour market and the response of the vocational education and training system by defining three specifications:

The employment specification:	what people in employment are expected to do.
The learning specification:	what students in vocational education and training must learn in order to meet these expectations.
The assessment specification:	how the competence of students will be judged.

Functional analysis is the method used to define the employment specification in a way which meets fast changing labour market needs. This Manual concentrates solely on this part of the vocational education and training standard. Most countries have well developed systems for the design of the curriculum (the learning specification) – so support in this area is not so urgent. What is required in the many countries which are moving towards a market economy is a clear method for specifying the current and future needs of employment. That is what the Manual is designed to do.

There are two versions of the Manual. This is the complete version. A summary version has been prepared together with a set of presentation slides for use in training vocational education and training experts and other practitioners in the functional analysis process. The summary version was used at an international training seminar held in Minsk in September 2000. Delegates from Belarus, Georgia , Moldova, Mongolia, Kazakhstan, Kyrgyzstan, Ukraine and Uzbekistan attended and developed employment specifications for three occupations using the functional analysis method. Feedback from this seminar and the example analyses produced by the delegates are included in Annex 5.

Bob Mansfield
PRIME Research and Development Ltd
Harrogate, UK, September 2000

A Note on Terminology

Terminology is a problem in both labour market analysis and vocational education and training because many English words are used, internationally, to describe key concepts. The problems are two-fold. First, English is a notoriously ambiguous language – with many different meanings for some words and many different words available to describe the same thing. For example, the key term 'standard' has four meanings in English usage, two of which contradict each other. In the phrase 'our staff are trained to meet our customer service standards', the word 'standard' implies high quality. However, in the phrase 'this car has standard equipment', the same word, 'standard', means the minimum or barely acceptable level of equipment.

Second, some terms are used internationally in a different way from the way in which they are used by native speakers in the UK. For example, the term 'qualification' is used in many countries to mean 'skill' or 'capability', as in 'key qualifications' or 'qualification characteristics'. In the UK it is usually used to mean the certificate which a person receives at the end of a programme of learning.

As far as possible I have tried to be consistent in the preparation of this Manual, but I am aware that there are some terms which are likely to be misinterpreted because they are not familiar in some countries. I have also tried to deliberately avoid terms and concepts which are known to cause difficulties. One concept in particular – 'competence' or 'competencies' – has been avoided as far as possible because it has multiple meanings.

There are two areas in which potential confusions remain. The first is the way in which we divide up the branches of the economy into groupings like 'Engineering', 'Manufacturing', 'Tourism'. In keeping with UK practice I have described these branches as 'Sectors' and, sometimes, 'Occupational Sectors'. If I describe groups of sectors I use terms like the 'Industrial Sector' (those sectors involved in extraction, processing and manufacture) or the 'Service Sector' (those sectors involved in providing services to people and organisations).

The second area of potential confusion is the way in which we describe the grouping of work activities both for employment and vocational education and training. The most common term used internationally is 'Job'. I have not used this term because this is a way of describing how each employer organises the work in their particular workplace. This manual is about developing national descriptions of work activity. I have used the term 'occupations' to describe these groupings. In this sense, 'Plumbing' is an occupation, 'Engineering Machining' is an occupation, 'Managing a Restaurant' is an occupation.

Another term which I have avoided is 'Task'. To describe the things that people do at work I have used the terms 'work activities' or 'outcomes'.

Finally, I have introduced a number of terms in this Manual which may be unfamiliar – like 'function' and 'outcome' – which I have explained in the text.

Any remaining misunderstandings are my responsibility.

Bob Mansfield

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Section 1: Vocational Education and Training – Meeting the Needs of the Labour Market - An International Perspective

The purpose of vocational education and training

The primary purpose of any vocational education and training system is to develop sufficient people with the right skills to meet labour market demands. All vocational education and training systems face the challenge of matching the skills, knowledge and attitudes of the students of the system to the needs of employment - the labour market.

In the past, vocational education and training was based on the design of the curriculum – a specification of the knowledge and skills the student needed to learn. In the most effective systems, the curriculum was made more relevant to employment needs by involving employers in curriculum design – usually through some form of curriculum committee.

However, as a result of economic and industrial changes from the 1970s onwards, it became clear that modifications made to the curriculum were not sufficient to meet new employment requirements. Changes in the economy were becoming very rapid and some of the advances in technology could not be covered by traditional subjects and disciplines. In many developed countries the relationship between the vocational education and training system and the needs of employment weakened and employers started to complain about the lack of relevance of the vocational education and training curriculum. Many governments started to reform their vocational education and training systems to strengthen the link between vocational education and training programmes and the new needs of employment.

The implications of economic change

The new needs of employment, which emerged in the 1970s, and still continue throughout the world, have been written about extensively. This manual will not try to describe them in detail. However, here is a summary of the main changes and their consequences for people at work.

In manufacturing industry there is an increase in product ranges as consumers demand more variety and choice. A larger range of products have to be designed, planned, manufactured and delivered to the customer. This reduces the 'lead time' for both design and production. Traditional mass production systems have declined. Here is an example to illustrate this change.

In the early 1970s, a clothing manufacturer in the north of England manufactured a single style of shirt for a national retailer. The company had been making the same style, pattern and colour for over 10 years. In 1990, the same manufacturer was making twenty different styles of shirt in a range of six colours and patterns (120 variations). The style range changed every four months (360 variations per year). They also manufactured ten styles of women's blouses in three different colours.

This type of change has affected all production sectors - vehicle manufacture, building, electronics, furniture making. Every sector is now making a greater variety of products, which change frequently as the pace of innovation increases.

Similar changes have affected the service sectors. As national wealth increases, customers demand more and better services so similar trends appear in these sectors. Here are some examples from the financial services sector.

In 1980, the largest British bank had one type of savings account - called a deposit account. It now has seven.

In 1980 there were five major banks in the UK. There are now twelve.

The National Savings scheme (run by the Government) had four savings schemes in 1980. It now has ten.

All companies have to compete strongly for customers, often against international competition, so product and service quality, price and customer care become very important.

The consequences are:

- more multi-skilled workers are needed - people who are capable of adapting quickly to new skills demands and changing methods of work organisation;
- less low skilled manual labour is needed in industry - more highly skilled labour is required, particularly at technician levels;
- with the decline in traditional manual skills, more knowledge and conceptual content is needed to manage automated, computer controlled systems - computer systems also affect the service sectors;
- industries which continue to rely on mass production systems with semi and unskilled labour are 'exported' to developing, low labour cost economies;
- people increasingly become directly responsible for quality assurance and improvement and the control of their own work activities;
- there is more direct contact with customers and clients, and customer service standards continue to increase;
- as systems become more complex, coordination of work activity is required at every occupational level - which increases the need for effective team working and cooperation.

Each of these changes must be reflected in the vocational education and training programmes designed to meet labour market needs. What is needed is a much closer link between the needs of the labour market and the system of education and training, and new methods for defining that link.

How the vocational education and training system responds to change

In response to these changes, many countries in Europe have reformed their vocational education and training systems. The type of reform varies, but there are common patterns which can be identified. Here are examples of the changes that have been made in many countries[1].

Figure 1: The vocational education and training response to economic change

The change	Examples
Broader descriptions of occupations.	There is a tendency for occupations to be grouped into broader occupational groupings or 'families' for training purposes - rather than narrow occupations and jobs. The emphasis is on broad based training in relatively stable occupational skills, which can be adapted as the content and structure of jobs change. Germany has 350 training occupations compared to 600 in 1970.
Broader descriptions of work activity.	Because the content of jobs and work tasks change so rapidly, there is a trend for work activities to be expressed as functions or outcomes, which allows for changes in technology and work organisation. The UK method, 'functional analysis', the subject of this manual, was designed for this purpose. Other examples include Germany which describes 'work tasks and functions' in its training curricula, as does Turkey, assisted by the German research institute BIBB. The Czech Republic describes 'sets of work activities'.
Core skills.	Core skills are the general requirements of employment and include the use of number, communication, problem solving, decision making and learning to learn skills. They are specified as part of the vocational curriculum to prepare people for future change and adaptability. In the UK 'key skills' have to be identified within vocational education and training standards and qualifications. Similar developments may be seen in all European countries - 'compétences transversales' in France, 'Schlüsselqualifikationen' (Key Qualifications) in Germany.
Flexible learning design - modules.	Curricula and qualifications are broken into 'modules' or 'units' which can be combined in different ways to give flexibility in learning design. Combinations of modules can be developed to meet local, company, sector or national needs. There are examples of this trend in all western European countries.
Flexible learning delivery - open/distance learning and work based learning.	Open and distance learning is encouraged by the development of computer technology. Work based learning, combining vocational education with on job training, becomes more important as technologies change so rapidly that vocational schools and colleges are unable to keep pace with the rate of change.

1 The changes are summarised from 'Qualification and Training Methods - Manual Volume 3 - The Labour Market and Vocational Education and Training Standards, Part 1, The Impact of Labour Market Information on Vocational Education and Training Standards, European Training Foundation, June 2000.

The change	Examples
Flexibility in the development of vocational education and training standards.	Vocational education and training standards have, in the past, been inflexible and slow to respond to changes in labour market requirements. However, there are approaches and methods which are designed to allow standards to be updated quickly. For example, German employers and trade unions, assisted by vocational education and training researchers of the Federal Vocational Education and Training Institute (BIBB), designed four new vocational education and training standards in less than one year in the field of information and communication.
Analysis of labour market needs in terms of the content of occupations.	Although accurate statistical information is critical to vocational education and training planners, it is important to review and update the content of occupations to inform vocational education and training curriculum design. The traditional processes of vocational education and training design, focusing on the curriculum, may be too slow for periods of rapid change.

Vocational education and training standards

Perhaps the most important response to these economic changes, throughout Europe and in other developed countries, has been to develop **vocational education and training standards** – clear descriptions of labour market needs which are closely linked to the vocational education and training learning programmes. The title 'vocational education and training standard' is used as a common European description. In each country the standards have slightly different names. In the UK they are called 'National Occupational Standards', in France, 'Référentiels Professionels', in Germany, 'Ausbildungsordnungen'.

In each country, the vocational education and training standards also have different components and characteristics as well as different names, but they all share a common pattern. Embedded in all vocational education and training standards are three specifications which are the answers to three questions, as shown in the table below:

Figure 2: The three components of a vocational education and training standard

The question:	The specification which answers the question:
What does the student need to be able to do in employment?	The employment specification
What does the student need to learn to be effective in employment?	The learning specification (the curriculum)
How will we know what the student has learned and is able to do in employment?	The assessment specification

This simple list of three questions and three specifications produces a vocational education and training standard which has a close link to the labour market. And because this format is shared by all vocational education and training standards we have described it as an 'International Vocational Education and Training Standard'.

In practice, there will be more information and specifications contained in the vocational education and training standards of a particular country. They may include:

Figure 3: Additional components of vocational education and training standards

- The vocational education and training legislation which regulates the design and use of the standard;
- The classification and description of the occupation described by the standard;
- The entry requirements for students and other regulations about access (age, gender etc);
- More detailed syllabus information – like learning plans, timetables, lesson plans;
- The duration of the learning programme;
- The location of the learning programme – including the level and type of institution authorised to deliver the vocational education and training programme and any arrangements for work placements;
- Guidance for teachers, trainers and assessors;
- The qualification requirements for teachers and trainers;
- Marking and examination schemes and criteria.

How many of these additional components are included is for each country to decide. The presence or absence of any one of these components does not mean that a country's vocational education and training standard is any better or worse than any other.

It is important that we define the international vocational education and training standard with the three specifications described in Figure 2 above. The object of developing an international standard is to be 'inclusive'. What we are defining is **what must** be included for there to be a standard at all – we do not specify **how** each component is defined and delivered. So, for example, there must be a learning specification – but what it is called, how it is defined, the level of detail, the length and location of the learning programme are not part of the international specification.

The important lesson for most European countries has been that the design of vocational education and training programmes **must start with an employment specification** – we cannot move directly to the learning specification and design the curriculum first. The employment specification can serve two functions. For new vocational education and training programmes it is the starting point in programme design. For existing vocational education and training programmes which are based on a curriculum (a learning specification) the employment specification can be used to audit the content of the curriculum to check that it is relevant to labour market needs.

It is important to recognise that a vocational education and training standard is not just a teaching document. In the past this was the case – and in some countries it still is. Some vocational education and training standards are little more than a detailed curriculum, which teachers use to plan the education and training programme. The employment specification, even if it exists, can be very vague and general.

When vocational education and training standards are developed with a clear and detailed employment specification they become a useful tool for many different users, as shown in the table below.

Figure 4: Users of vocational education and training standards

Who is interested in standards?	Why are they interested in standards?	What do they use standards for?
Employers	This is what I want people to be able to do	■ Recruitment specifications ■ Job descriptions ■ Appraisal documents ■ Workforce planning ■ Identifying and meeting training and development needs
Economic planners and politicians	These are the skills that our economy needs to be able to compete	■ Strategic manpower plans ■ Deciding priorities for vocational education and training funding
Vocational education and training planners	This is what people must be able to do when they have completed the vocational education and training programme	■ Planning vocational education and training programmes ■ Allocating resources to vocational education and training programmes
Teachers	These are the skills and knowledge that students must learn	■ Curriculum design ■ Lesson planning ■ Assessment planning
Career advisers	These are the things that employers expect vocational education and training graduates to be able to do	■ Advising school students and adults ■ Individual career development plans
Students	This is what I will know and be able to do when I have finished my education and training	■ Choosing vocational education and training programmes
Parents	This is what my son/daughter will know and be able to do when they have finished their education and training	■ Helping their children choose vocational education and training programmes

Notice in particular that a detailed employment specification can be directly used by employers for a number of personnel functions. Employers use resources to describe people's performance at work for a number of different purposes – for recruitment, appraisal, job design, promotion, training etc. A curriculum is not useful for any of these purposes – but the employment specification is.

Roles in the development of vocational education and training standards

It is for employers and other actors in the world of employment[2], to define what the student needs to be able to do – the employment specification.

It is the role of the educational professional to use this specification to define what the student needs to learn and how the learning will be evaluated. It is not helpful to ask employers about the specific content of the curriculum – they are not educationalists.

The social partners do have a role in supporting the processes of education and assessment – but this role is advisory and cooperative. This means that they may **contribute** to the learning and assessment process by identifying critical aspects of competence to be assessed, offering work placements, on job tuition, opportunities for assessment and assessment services, but they do not **define** the specifications for these processes, unless they do the training themselves. These are educational matters and it is helpful to separate the different types of expertise. Employers have more knowledge about labour market matters – but educationalists know more about the process of learning.

An example of an international vocational education and training standard

In Annex 1 is an example of a module taken from an international vocational education and training standard. The module describes the serving of food to customers and shows how the three specifications are used to define; what the student will achieve (the employment specification), the knowledge and skills that the student will learn (the learning specification) and the evidence that will be needed to show that the student is competent (the assessment specification).

At this stage, the most important things to focus on are the title of the Module and the statements in the first column, which are called 'performance requirements'. Here is an extract:

Figure 5: An extract from a vocational education and training standard

The module (title): Serve food and drinks to customers

The performance requirements:

(a) welcome customers politely, take and store coats and other personal items

(b) check reservations, offer options where tables are not available and show customers to a table

(c) take orders for drinks

(d) take orders for food, explain menu items accurately, inform customers about special dishes and advise on customer choice when asked to do so

(e) pass orders on to the kitchen and monitor the progress of the preparation of dishes

(f) collect orders from the kitchen and transport and serve dishes safely, politely and hygienically (there are more requirements – this is only an extract)

2 Other actors will include trades unions, economic planners, users of products and services.

The performance requirement is the most important part of the vocational education and training standard. It is the **employment specification**, which describes what the student must be able to do in employment. In fact, this specification defines not just what a student from a vocational education and training programme needs to do – it describes what a competent waiter needs to do.

As has been pointed out above, the employment specification must be developed by those in employment. But this specification does not arrive by magic! Employers need help in defining what they need – we do not just give them a blank sheet of paper – we give them a method which is used to help them analyse and describe work activity. That is the subject of the next section. In the remainder of this section we will look at some simple approaches which will help us to define employment specifications which reflect the important changes in the economy.

Identifying current and future skill needs

We have already outlined at the beginning of this section the kinds of changes which have occurred in the economy which have, in turn, resulted in changes in the ways in which we prepare people for work. In the final part of this section, we concentrate on defining those changes more precisely and identifying some methods which we can use, together with employers, to collect information about current and future skill needs.

Research in Europe[3] has identified four significant areas in which change is rapid and significant. In each of these areas there are specific changes which need to be taken into account when we are preparing the employment specification. They are described below.

Figure 6: Significant areas of change

Area of change	Type of change
Technology	■ Equipment and machinery ■ Micro processor based technologies which affects communication, the processing of information and the use of multi-media ■ The bio-technologies, including genetics ■ Energy and the environment ■ Materials ■ Chemicals (including pharmaceuticals)
Regulations and legislation	■ Health and safety ■ Consumer protection ■ Environmental protection ■ Finance and auditing ■ Introduction of ISO and other international standards ■ Social legislation ■ Vocational education and training legislation

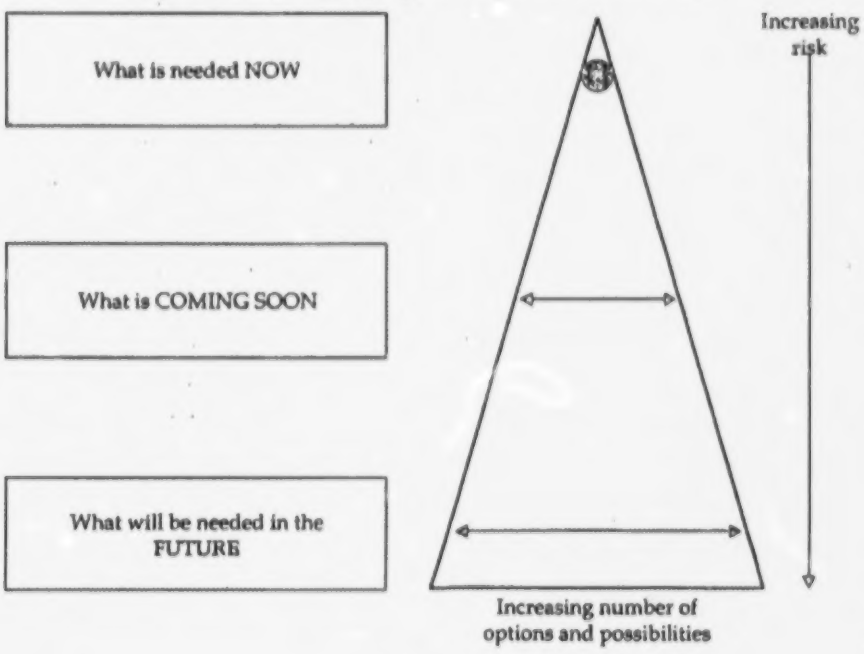
3 A complete description, with examples, can be found in 'Qualification and Training Methods – Manual Volume 3 - The Labour Market and Vocational Education and Training Standards. Op Cit.

Area of change	Type of change
Markets and customer requirements	▫ Internationalisation ▫ More direct customer contact ▫ Direct advice in selling roles ▫ Quality standards
Work organisation and organisational culture	▫ Management models and systems ▫ Decline in mass production systems ▫ Rate of innovation ▫ Core business philosophy ▫ The quality organisation ▫ Growth of women in employment ▫ Growth in self-employment

The impact of change

As well as collecting information about the **type** of change we are also interested in the current and future **impact** of these changes. We cannot just study the existing labour market. In all economies this will only tell us what employers need now. The whole point of the vocational education and training system is to develop people for future needs and demands. This raises the question of how we can predict future needs. The diagram below gives a framework for understanding the nature of future labour markets.

Figure 7: Identifying future labour market needs


What is needed NOW
What is COMING SOON
What will be needed in the FUTURE
Increasing risk
Increasing number of options and possibilities

The diagram shows three stages in labour market analysis. The first stage describes the current needs of most employers (What is needed NOW). The second stage describes the needs of some advanced employers within the economy (What is COMING SOON) - some of these companies will be inward investors. The third stage describes international trends which may not have an immediate impact, but will be likely to affect the economy at some later date (What is needed in the FUTURE). An analogy might help to understand stages two and three which deal with future requirements.

Perceiving what is coming soon is rather like seeing a traveller on a distant mountainside. We know there is a person and they are coming towards us – but the precise details are not clear. We can look at them through binoculars and this will tell us more. We might be able to identify their gender, their race and their facial features, but even this magnified and enhanced view will not tell us how tall they are, their political views, their religion or whether they are married.

To find this out we would need to wait until they have arrived – then we would have the much more detailed information. But even although we lack the fully detailed information we will still be able to prepare for their arrival. Any traveller is likely to need food, drink and accommodation – so we can make some preparations for their arrival. But if we do not know, for example, their religion, we would avoid preparing a meal that included food which was prohibited by certain religious groups – for example, pork or beef.

This is similar to the second stage in labour market analysis – what is coming soon. We know that this need is coming and we already have some detail from the few advanced employers who are already expressing this need. But we do not have the full detail – so we need to anticipate a number of different options. We usually do this by generalising the vocational education and training Standards and the supporting curriculum and avoiding adding any specific detail until we are clearer about the precise needs. In vocational education and training a number of methods are used to do this – for example, by defining broad occupational families or fields and by including 'generalised' skills, the core or key skills.

An example of this is the development of the skills involved in problem solving and team working. Some employers do not encourage problem solving or team working – workers are expected to work closely to the instructions provided by supervisors and not to consult with each other. Problems are dealt with by technical specialists. However, some employers are starting to encourage problem solving and team working – for example, by developing 'quality circles' where groups of workers identify and propose solutions to quality problems and suggest improvements to working methods.

So, we know that this change is starting to have an impact on the economy and evidence from other countries should tell us that although many employers do not encourage the use of these skills at the moment, they may do so in the future. The answer is not to train students to work in quality circles. This is too specific and represents just one way in which employment needs are changing. If employers decide to have quality circles they will train their own staff in their specific methods. But training in the general principles of problem solving and setting up the learning environment to develop team working will be helpful because students will be able to quickly adapt to a number of different team working environments as they become more common in industry.

But back to the mountain and the traveller. Imagine now that all we know is that something is happening on the other side of the mountain. What we know is what other people have told us, so our view is extremely unclear. We can read about what is happening and guess at the precise details, we may also visit the other side of the mountain to see what is happening there.

This is the third stage in labour market analysis – what is needed in the future. We may only have information about international trends, so there are very many options. We can visit other countries and see the trend in action – but we know that the way it will impact on our own country may be very different.

Preparing for these trends can be very difficult because the number of options and the relative risk increases as we move into this area. This is shown on the diagram by the triangle which increases in width to show the different options which may be possible and the arrow which indicates increasing risk. The risk operates in two directions. If we fail to develop a skill which may be needed in the future we will hold back economic growth if the skill is needed and it has not been developed. On the other hand, if we develop a skill which turns out not to be needed we will have wasted the learning resource.

A good example of this is the development of telecommunications technology. There seem to be two options for the future. One is that land based systems will be improved by the use of digital networks using fibre optic cables. The other possibility is that land based networks will be replaced by mobile systems using radio, microwave and satellite communications systems. If we are training future telecommunications engineers this is a real dilemma.

One method which is often used to anticipate changes of this sort is to develop vocational education and training graduates who have independent learning skills, so that they can quickly adapt and change as the new trends become clearer. So we would train students in the common principles and the basic principles of both telecommunications systems, without being too specific, but also train them in 'learning to learn' skills so that they will be adaptable in a fast changing industry.

Any vocational education and training system must balance both current and future needs. Vocational education and training graduates must be competent to work in the existing labour market and be ready and able to adapt to emerging and new requirements.

Type of change and impact of change

We now have two dimensions – the type of change and the impact of change (current, coming soon and future needs) We can now put these two dimensions together as a matrix. The full matrix is shown in Annex 3 and an extract showing changes in technology is shown below.

Changes in technology

Figure 8: The change matrix – Overall framework

Area of technology	Current requirements	Coming soon	In the future
Machinery and equipment			
Micro processor based technologies			
The bio-technologies, including genetics			
Energy and the environment			
Materials			
Chemicals (including pharmaceuticals)			

We can use this matrix to work with employers and others in the world of employment within a specific occupational sector, to identify both the type of change which is significant and the impact this is likely to have in the future.

Here is a hypothetical example of how the matrix might be completed in the area of technology for the catering sector.

Changes in technology affecting catering

Figure 9: The change matrix – Example for the catering sector

Area of technology	Current requirements	Coming soon	In the future
Machinery and equipment	Mainly hand tools and mechanical and electrical processing equipment Microwave technology	High powered convection ovens Cook/chill systems and improvements in freezer technology will increase product ranges	New methods of cooking – extension of microwave technology to hand held devices Laser cutting systems to replace knives etc.
Micro processor based technologies	Electronic tills Direct link credit card authorisation Supply orders by fax	Internet based restaurant reservations and supply ordering Infra red links and hand held computers to take orders and pass information to the kitchen	Very difficult to predict because change is so rapid Cybercafes – extended to all restaurants having Internet links Could affect restaurant design – 'virtual' restaurants?
The bio-technologies, including genetics	Little current impact – except for consumer concerns over genetically modified food products	The origin of food products is likely to become an issue of competitive advantage – some restaurants are claiming to use only non-genetically modified products	Depends on how customers respond to genetic modification. If found to be safe and with consumer support this could result in many new food products and cost reductions
Energy and the environment	Low energy systems are already being used to reduce costs Some consumer interest in organic products Increase in vegetarianism resulting from environmental concerns	The interest in 'eco-friendly' products is likely to increase – more organics and free range products, which should reduce in cost as demand increases More vegetarian options will be needed	Increased requirement to state the origin of products – could become an area of competitive advantage Likely demand for registered suppliers, animal care standards etc
Materials	Many new food products being introduced to meet consumer demand for variety New materials to improve hygiene	Completely new food products are being developed, including exotic breeds, species – this will mean new recipes, dishes etc	Internationalisation may increase demand for even more exotic products
Chemicals (including pharmaceuticals)	Not really an issue for this sector	Not really an issue for this sector	Not really an issue for this sector

Embedding changes in the vocational education and training standard

It is important that this analysis is reviewed frequently to keep it up to date. It is also important that as changes arise, they are included within vocational education and training standards and curricula. In the example given in Figure 8 there is little that will immediately affect the work of a waiter - but there are a number of areas which vocational education and training planners will need to monitor which will eventually affect some of the outcomes described in the extract in Figure 5 above. Let's look at four examples from the extract:

(b) check reservations, offer options where tables are not available and show customers to a table

(c) take orders for drinks

(d) take orders for food, explain menu items accurately, inform customers about special dishes and advise on customer choice when asked to do so

(e) pass orders on to the kitchen and monitor the progress of the preparation of dishes

In performance requirement (b) the way in which reservations will be made and checked in the future may involve the use of information technology and the internet - indeed, some restaurants may already be using these methods. It will be necessary to include these methods in the vocational education and training standard and the curriculum. At this stage, it may involve 'knowledge of' such systems, but students could also use simulations to set up reservation systems or examine the internet sites of restaurants which offer on-line reservations.

Performance requirements (c), (d) and (e) involve taking orders for food and drinks and passing on orders to the kitchen. In the future, this could be done with hand held computers which will also monitor the progress of orders. This development will need to be added to the methods used to take and pass on orders. At this stage, articles from professional and trade journals could be scanned to find examples of this technology - and product descriptions from manufacturers could also be obtained so that students know about and are prepared for these developments.

Performance requirement (c) requires that menu items are explained and that customers are informed about special dishes. As customers become interested in new food products and 'eco friendly' food sources, the knowledge required to be able to explain menu items and answer questions about the origins of food products will increase. This will need to be added to the curriculum - as well as methods of finding out about this information.

Gathering information about economic changes

To gather the information we can use a number of methods. Here are some examples.

Figure 10: Gathering data on changes - Example methods

Method	Examples
Focus groups and workshops Consulting directly with people who work in the occupation and asking them to focus on the existing best practice, the trends in the economy and the trends in competitor economies.	In a European study on future needs in the construction sector, many respondents reported that technician level and professional level employees were often involved in project teams with members from different specialisms. However, current training did not recognise this change. A vocational education and training standard was developed entitled 'Working in multi-disciplinary teams' to provide training to meet this trend.
Sector studies and surveys Sending out questionnaires to employers asking for up to date information.	In a sector study carried out in Central Asia, employers reported that they were importing German and Italian baking equipment and that employees were expected to carry out routine maintenance on the equipment. The vocational education and training schools reported that they could not afford to buy this type of equipment - but the employers told the schools that what was needed was some training in interpreting the manuals that came with the machines. This requirement was added to the standard as 'Interpret technical manuals written in a foreign language'. The level of language learning was very basic and concentrated on the type of instructions required for simple maintenance, cleaning and adjusting.
International studies on global economic trends	As part of vocational education and training reform in an Eastern European country, international studies on the welding technology of oil pipelines was studied to prepare vocational education and training programmes to train welders. The objective was to develop welders who could compete with international companies for regional oil pipeline projects.
Scanning trends in publications There are two ways in which this can be done: (a) scanning professional and trade journals and magazines for information about new developments in the sector; (b) scanning job advertisements for staff and noting any new and emerging requirements.	(a) An Eastern European country developed a programme in Computer Numerical Controlled (CNC) machining starting from journal articles in Western European engineering publications because they could not find local companies to conduct direct studies. (b) In Russia, vocational education and training planners who wanted to develop their programmes in the retail and service sectors scanned job advertisements and found that 85% contained requirements for good communication and customer care. These requirements were included in the reformed programmes. In Germany, advertisements were scanned to develop the first draft for a new vocational education and training standard in information technology maintenance.

There are many other methods for identifying these trends. Details can be found in publications from international agencies like the International Labour Organisation (ILO), the European Training Foundation, CEDEFOP, OECD etc.

Section 2: Describing Work Activity – Functional Analysis

Describing work activity so that we can produce an employment specification to start the process of vocational education and training standard development is a specialisation in its own right. This manual is about one of the methods used to do this – the method called functional analysis. But before describing the method, we need to be clear about why we use this method rather than any other.

Describing behaviour

Functional analysis is one way of describing what people do at work. But it is not the only way. There are four different ways of describing people – they are:

- The knowledge and skills people possess
- The sort of person they are
- What people do
- The results people achieve

Each of these has been used in the past to describe work activity - and employers also use them in a haphazard and unstructured way. So, for example, if we were to ask a group of restaurant managers what they require from their waiters, here are some typical answers they might give:

We need waiters who:

- are knowledgeable about regional dishes
- have good communication skills
- understand about hygiene
- are honest and trustworthy
- are responsible and courteous
- can operate an electronic till
- can use trays and food trolleys
- can calculate the bill accurately and present it to the customer
- can explain menu items accurately
- can welcome customers politely

No doubt there could be many more statements, but these are typical of the sorts of descriptions which employers offer. All these descriptions are accurate and essential for a person to be a good waiter. But we need to understand that they are different types of statement and they have different uses for different purposes. First of all, let's examine each statement against the four ways of describing people. This is what we find.

Figure 11: Different ways of describing behaviour

The statement:	The type of description:
■ knowledgeable about regional dishes ■ have good communication skills ■ understand about hygiene	the knowledge and skills people possess
■ honest and trustworthy ■ responsible and courteous	the sort of person they are
■ operate an electronic till ■ use trays and food trolleys	what they do
■ calculate the bill accurately and present it to the customer ■ explain menu items accurately ■ welcome customers politely	the results people achieve

So, what we find when we talk to employers is that they mix up all sorts of different ways of describing what they want and what people need to do. What we also find is that some of these statements are very helpful if we are developing a vocational education and training programme – but others are less helpful. Let's take the statement 'knowledgeable about regional dishes'. This seems obvious as an essential item of knowledge for a waiter. But what will we teach the student? Will we teach them:

- the history of the regional cuisine?
- the ways in which the regional dishes are cooked?
- the ingredients which are used?
- the general descriptions of regional dishes?

The vocational education and training planner cannot be sure – so for safety's sake, they often include all these items in the curriculum. That's fine – but is all that knowledge needed? We need to remember that education and training is a valuable resource and we don't want to waste it.

Let's go back to the statement 'knowledgeable about regional dishes' and also back to the employers and ask '**why** does the student/waiter need to be knowledgeable about regional dishes?'. Here's how they might respond:

> *'A waiter needs to be knowledgeable about regional dishes so that they can explain menu items to customers, particularly those which they are not familiar with, which are likely to be the regional specialities'*

Notice what has happened. We have changed a statement about **the knowledge a person needs to possess** into a statement about **what a person has to achieve** – 'explain menu items to customers'. What the vocational education and training planner now knows is that students needs to know enough about regional dishes in order to explain their characteristics to a customer. It is unlikely that the customer will want to know how it is cooked, but if they do then they or the waiter can ask the chef. Nor will they require a detailed history lesson, but information about the ingredients and general characteristics will be helpful.

Now we can do the same thing with each of the statements in the list – just ask 'why is this needed'. We have done this in the table below:

Figure 12: Identifying the purpose – 'Why is this needed?'

The statement:	Why is this needed?
■ knowledgeable about regional dishes	■ so that they can explain menu items to customers
■ have good communication skills	■ so that they can explain things accurately
	■ so that they can act politely towards customers
	■ so that they can respond to complaints
■ understand about hygiene	■ so that they handle food and dishes in a manner which avoids contamination
	■ so that their personal hygiene is acceptable to customers
■ honest and trustworthy	■ so that they can take responsibility for taking and storing customers' possessions
	■ so that they calculate the bill accurately and give the correct change
■ responsible and courteous	■ so that they treat customers politely
	■ so that customers have a good opinion of the restaurant
■ operate an electronic till	■ so that they can calculate the bill accurately and present it to the customer
■ use trays and food trolleys	■ so that they can transport and serve dishes safely, politely and hygienically
■ calculate the bill accurately and present it to the customer	■ so that bills are calculated accurately
■ explain menu items accurately	■ so that menu items are explained accurately
■ welcome customers politely	■ so that customers are welcomed politely

In three of the four boxes we have shown that descriptions of people's knowledge, skills, personal qualities and the tasks they perform are all done for a purpose. They know these things, they have these skills, they are like this and they can do these tasks – to achieve a result – to explain menu items to customers, to respond to complaints, to calculate the bill accurately, etc.

The exception is the last box. Here, when we ask the question 'why' we get the same result. The reason why waiters need to 'explain menu items accurately' is so that 'menu items are explained accurately'! This happens because these statements describe the purpose of work activity already – they need no further elaboration.

In the first three cases, the knowledge, personal qualities and skills/tasks are needed in order to achieve something else. For each of them we can still ask the question 'why?'.

From the point of view of developing vocational education and training standards, the first three descriptions belong to the learning specification – students need to learn the knowledge, skills, tasks and personal qualities required in order to achieve results at work.

The results we achieve at work are called the employment specification. And, as we pointed out above, we must define the employment specification first. Therefore, we need a method which is designed to do this.

Methods for describing what people do at work

We need a method for describing what people are expected to achieve at work. Before we move on any further, we need to consider how and where we will get the information to describe the employment specification.

We cannot afford to base our vocational education and training standards only on what people actually do at work, now. If what we were doing now were adequate to meet the needs of the economy, we would not need to make any changes either to our economy or to our vocational education and training system. We need a method which looks beyond current work activities. This means that the method must have the following characteristics:

The method must:

- Identify the **best** examples of current practice – what is happening now;
- Include judgements about what **should** be happening now – based on international benchmarks of best practice;
- Include judgements about what important requirements will be needed in the **future** – so that vocational education and training students are prepared for changes which we know about;
- Include all the new requirements of employment which are related to the significant **changes** in the economy;
- Be **flexible** so that it can be modified to include the rapid changes in methods, technology and culture.

When people started to take an interest in what people needed to achieve at work – so that vocational education and training curricula could be made more relevant – they looked first at task analysis. Task analysis involves studying people at work and a number of different methods have been developed to do this.

Task analysis

Here are some methods and systems of task analysis:

- hierarchical task analysis
- task inventories
- functional job analysis
- the position analysis questionnaire
- the critical incident technique
- basic skills and generic skills matrices

Task analysis does have its uses. It is useful for describing manual activities in stable occupations which do not change very much. But in occupations which are changing, the task analysis can outdate very quickly requiring constant and expensive revision.

This manual is not about task analysis but functional analysis. Functional analysis has been developed to meet the requirements we described above and to overcome a number of limitations in task analysis - these are:

- Task analysis is based on observing what people do now - but as we have said above, we need to describe not what people actually do, but what they **should** do, based on international benchmarks.
- Task analysis tends to produce specifications which are highly detailed and expensive to develop. Changes in conditions usually require a separate task analysis. The level of detail creates a lot of bureaucracy and administration.
- Task analysis was developed at a time when work activities were broken into small cycle, routine manual activities and clerical tasks, typical of mass production systems and paper based bureaucracies.
- Finally, task analysis is a development from the production systems designed using the principles of scientific management - where the non technical aspects of work are removed leaving small-scale tasks stripped of the planning, problem solving, communication and coordination skills - which are all the requirements of the modern economy as workforces are required to become multi-skilled and adaptable.

The alternative to task analysis is to focus on the purpose or 'function' of work activities. With this method we produce descriptions which are **independent of the technology or methods which are used to achieve the function**.

The analysis process has two stages, called 'functional mapping' and 'functional analysis'.

Functional mapping - Occupational fields and sectors

The original method, developed in the UK, involves 'mapping' an entire occupational sector (field). Jobs and job titles are not identified separately - the purpose is to identify what the key functions are, not who performs them. This approach is useful in countries where there are no existing lists of official training occupations or where part of the vocational education and training reform process is to reform the ways in which occupations are described. Here are two examples of this approach.

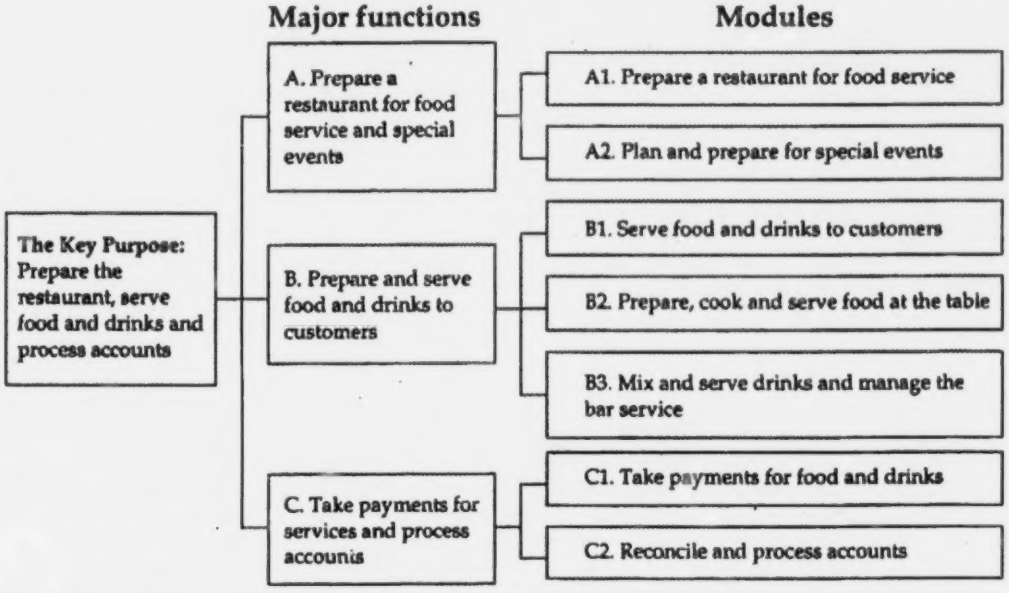
In the UK, functional mapping is used to define the scope of an occupational sector and the major functions. The mapping is the responsibility of a National Training Organisation which is an employer based organisation with responsibility for the provision of training for an occupational sector. From these major functions, 'Units of Competence' are developed which are similar to vocational education and training standards – the main difference being that in the UK the curriculum is not specified at national level. The Units are grouped together to form vocational qualifications (Note: in the UK, 'qualification' means the certificate or diploma).

In Germany in the late seventies the social partners in the field of metal working and electrical engineering decided that the 42 metal and 12 electrical engineering training occupations should be modified to take account of rapidly changing technology. The German Institute of Vocational Training (BIBB) used a functional approach to map the 54 occupations and used a cluster analysis to identify six metal and four electrical engineering functions. From these functions, 25 occupational profiles (vocational education and training standards) were developed. Following the implementation of the profiles in 1987, the functional approach was used to revise a number of other occupational fields.

Functional mapping - Occupations and training occupations

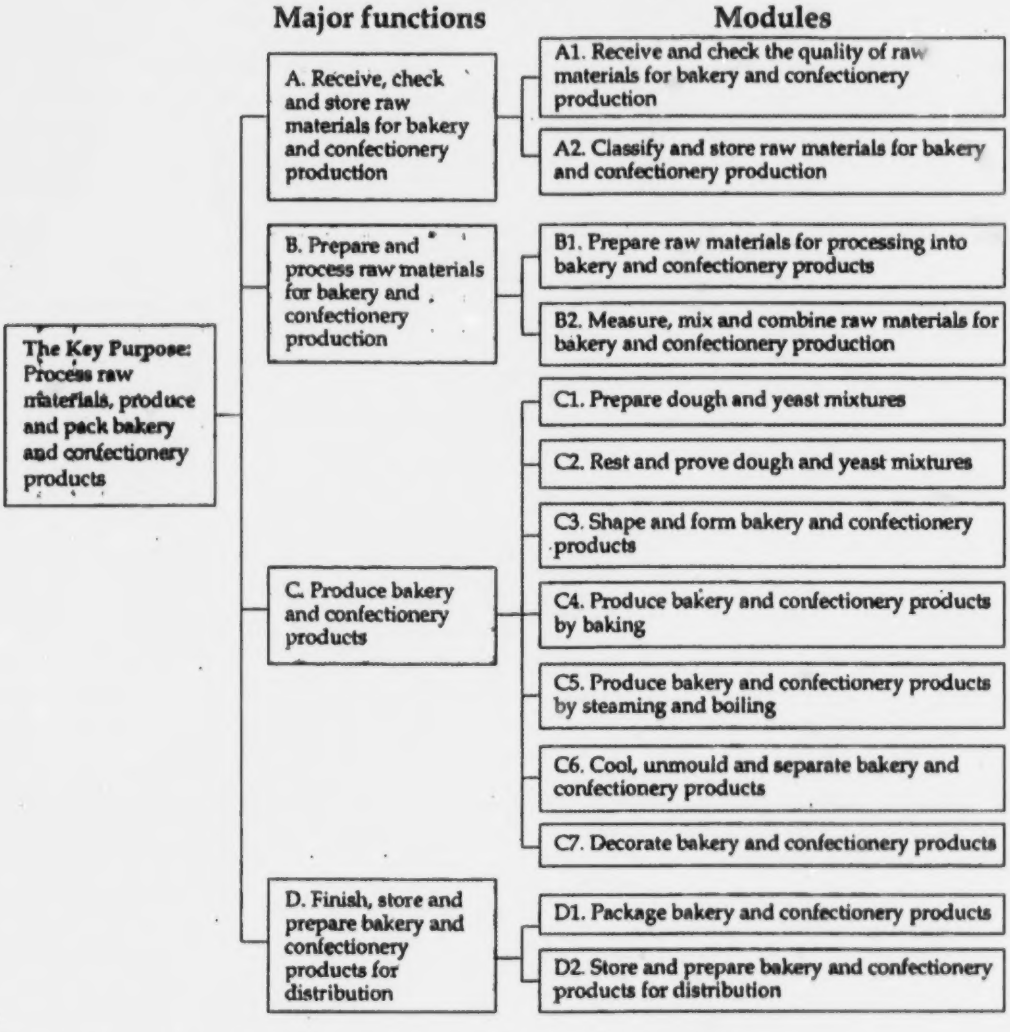
More often, countries already have official training classifications and occupations, so the mapping starts with each occupation or training occupation. Each 'map' is a complete vocational education and training Standard. Here are two examples.

Figure 13: Example 1 - A functional map of a vocational education and training standard for a restaurant waiter[4]


Major functions
Modules
The Key Purpose: Prepare the restaurant, serve food and drinks and process accounts
A. Prepare a restaurant for food service and special events
A1. Prepare a restaurant for food service
A2. Plan and prepare for special events
B. Prepare and serve food and drinks to customers
B1. Serve food and drinks to customers
B2. Prepare, cook and serve food at the table
B3. Mix and serve drinks and manage the bar service
C. Take payments for services and process accounts
C1. Take payments for food and drinks
C2. Reconcile and process accounts

4 Developed as an example for this manual.

Figure 14: Example 2 - A functional map of a vocational education and training standard for a bakery-confectionery worker[5]


Major functions
Modules
The Key Purpose: Process raw materials, produce and pack bakery and confectionery products
A. Receive, check and store raw materials for bakery and confectionery production
A1. Receive and check the quality of raw materials for bakery and confectionery production
A2. Classify and store raw materials for bakery and confectionery production
B. Prepare and process raw materials for bakery and confectionery production
B1. Prepare raw materials for processing into bakery and confectionery products
B2. Measure, mix and combine raw materials for bakery and confectionery production
C. Produce bakery and confectionery products
C1. Prepare dough and yeast mixtures
C2. Rest and prove dough and yeast mixtures
C3. Shape and form bakery and confectionery products
C4. Produce bakery and confectionery products by baking
C5. Produce bakery and confectionery products by steaming and boiling
C6. Cool, unmould and separate bakery and confectionery products
C7. Decorate bakery and confectionery products
D. Finish, store and prepare bakery and confectionery products for distribution
D1. Package bakery and confectionery products
D2. Store and prepare bakery and confectionery products for distribution

Functional mapping - General characteristics

The two example functional maps have these general characteristics:

1. To the left of each map is a single statement which is labelled the '**key purpose**'. The key purpose describes the occupation, but as an outcome - what has to be achieved.
2. To the right of the key purpose in the map are descriptions of the **major functions** which enable the key purpose to be met. In the example above, three major functions are identified for the waiter and four for bakery confectionery - but there may be more. This depends on the complexity of the occupation. These functions have been further analysed into statements, each of which will become a **module**.

5 Developed by the 'Standards 2000' working group, Republic of Mongolia.

3. The map may look like a hierarchy or a flow chart – but it is not. The statements are not placed in any order of priority or importance. Nor does the order of the statements always imply a sequence of activities – although in this case there is a sequence. The different groups of statements simply represent **different** and **separate** functions.

4. The mapping process stops when we reach a level of detail which is large enough to be the title of a module. Each module should be a distinct and separate work activity, using particular methods, materials, equipment or processes.

5. Codes are used to show the level of detail of each statement and its position in the analysis. The first stage of analysis, the major functions, is normally coded using a letter – 'A, B, C' etc. At the next stage in the analysis, the modules, numbers are added to the code, 'A1, A2, B1, B2' etc. If a further stage of analysis is needed, another number is added. So any further analysis of A1 would be coded 'A11, A12, A13' etc.

   This coding is helpful because it shows which area of the analysis the statement is from and the statements which are associated with it. This is particularly useful when the statements are separated and become the titles of individual modules. So, if we see a module with the code B22, we know there is another statement, B2, from which this statement has been developed. We also know that there is a B21 somewhere in the analysis and there might also be a B23 and B24.

6. Each statement has a similar grammatical structure. The first part is a description of the action or actions required to achieve the outcome. This is a verb or a number of verbs. Then we describe the object of the action, using a noun or nouns. Finally, and if necessary, we describe the context of the action – this could be the purpose of the action, to whom the action is directed etc. Here are two examples from the map.

The action: Verb(s)	The object of the action: Nouns	The context of the action:
serve	food and drinks	to customers
receive and check	the quality of raw materials	for bakery and confectionery production

We will now examine each part of the map in detail.

The key purpose

We develop the key purpose statement from the description of the occupation. Here is an extract from the original standard for the bakery-confectionery worker:

Name of Occupation: Bakery-confectionery worker

Objective: To prepare a skilled worker in bread-confectionery for medium and large enterprises

These two descriptions tell us the title of this job or occupation, and the kind of organisation in which the person will work. What it does not tell us is what the person is expected to do and the

outcomes they are expected to achieve in employment. To find out what bakery-confectionery workers are expected to achieve in employment, we need to speak to employers. Employers decided that they needed employees who can:

> Process raw materials, produce and pack bakery and confectionery products

This statement, which describes the outcomes that the person is expected to achieve, is called the 'key purpose' of the occupation. It describes what people are expected to do – not what their job is called.

We have seen an example of this process in the section above. Instead of referring to the job of a waiter, we described the key purpose, which is to:

> Prepare the restaurant, serve food and drinks and process accounts

This process is extremely valuable because although the descriptions often used to describe occupations can be obvious to most people, sometimes they are very vague. Here are some other examples, also taken from international projects:

Figure 15: The key purpose of occupations - Examples

Original description of the occupation	Key purpose
Bricklayer	Build walls and partitions from brick and blocks
Plasterer	Cover rough surfaces with mortar
Concrete worker	Mix and pour concrete to form foundations and the building framework
Piler (sheet and board)	Form wooden frames for shaping concrete sections
Chambermaid	Clean and service guest bedrooms and public areas
Tour arranger	Prepare tour itineraries which meet client requirements
Front of house receptionist	Process and facilitate the arrival, accommodation and departure of hotel guests
Computer technician	Install and test computers, peripherals and networks
Instrument technician	Install, test and maintain mechanical, electrical and electronic instruments

If we look at the table above, we will see that the key purpose for some of the occupations is obvious. For example, most people are aware that bricklayers 'build walls and partitions from brick and blocks' and that plasterers 'cover rough surfaces with mortar'. However, the occupation 'concrete worker' is not at all clear until we question employers and occupational specialists in the construction industry. Even less clear is the occupational description 'piling (sheet and board)'. This is because the term used is technical and only fully understood by those within the occupational sector. Another technical term is 'front of house'. Only people employed in the hotel trade are likely to understand this term.

The key purpose descriptions are even more useful when we come to 'higher level' occupations. Look at the last two occupations in the list. Although the occupational family or field is obvious (computers, instruments), the description 'technician' tells us very little about what the person actually does. The key purpose statement is much clearer.

The language of the functions

We have already seen from the section on the general characteristics of the map that all the statements use the same grammatical structure[6]. Here are some more examples. This time we have used a slightly different way of describing the three parts of the statement.

Figure 16: The structure of statements in the functional map - Examples

Statement	Do what? (the action - the verb)	To what? (the noun)	For what purpose? With what? To whom? What type?
Build walls and partitions from brick and blocks	build	walls and partitions	from brick and blocks (with what)
Cover rough surfaces with mortar	cover	rough surfaces	with mortar (with what)
Mix and pour concrete to form foundations and the building framework	mix and pour	concrete	to form foundations and the building framework (for what purpose)
Form wooden frames for shaping concrete sections	form	wooden frames	for shaping concrete sections (for what purpose)
Clean and service guest bedrooms and public areas	clean and service	guest bedrooms and public areas	none needed - the context is obvious
Prepare tour itineraries which meet client requirements	prepare	tour itineraries	which meet client requirements (for what purpose, to whom)
Process and facilitate the arrival, accommodation and departure of hotel guests	process and facilitate	the arrival, accommodation and departure	of hotel guests (to whom)
Install and test computers, peripherals and networks	install and test	computers, peripherals and networks	none needed - the context is obvious

6 In different languages, the grammar of the statements may be different. The structure of the verb, in English, is the infinitive. That means that each statement can be started with the phrase: 'The student must be able to ...'. This format should be followed using the grammar of the language which is being used.

Statement	Do what? (the action - the verb)	To what? (the noun)	For what purpose? With what? To whom? What type?
Install, test and maintain mechanical, electrical and electronic instruments	install, test and maintain	instruments	mechanical, electrical and electronic (what type)
Process raw materials, produce and pack bakery and confectionery	process produce and pack	raw materials bakery and confectionery products	none needed - the context is obvious
Store and prepare bakery and confectionery products for distribution	store and prepare	bakery and confectionery products	for distribution (for what purpose)

The next analysis stage - Major functions

We have seen from the example map above that the key purpose has been separated into four major functions. To do this we apply **classification rules** which ask the question 'in order to achieve (the outcome described by the key purpose), what are people expected to be able to do ...?'. The answer to the question will generally follow one of a number of patterns - which are the classification rules. The general patterns are:

- a linear process or sequence (like: plan, design, build);
- a cyclical process (like: develop, implement, evaluate);
- separation of different processes or methods (like: bake products, boil and steam products);
- separation of different products or outcomes (like: test mechanical components, test electrical components).

We need to find a classification which follows the 'logic' of the occupation. In many manufacturing and production industries we can follow the logic of the production cycle. This is what we have done in the bakery-confectionery worker example above, we have followed the process of manufacturing bakery and confectionery products. First, raw materials are received and checked when they arrive at the manufacturing plant. Then, the materials are processed and prepared for production. Then the products are produced. Finally the products are packaged, stored and prepared for distribution to customers. This 'logic' will be similar for many manufacturing operations.

Here are some more examples of classification rules.

Example 1: Install and commission electrical equipment
(Example of a linear sequence - which happens every time)

- Prepare a site for installation
- Install electrical equipment
- Commission and test electrical equipment

Example 2: Install solid facings on horizontal and vertical surfaces
(Example of different types/methods)

- Install tiles on horizontal and vertical surfaces
- Install stone and marble sheets on horizontal and vertical surfaces
- Install mosaics on horizontal and vertical surfaces
- Install sheet materials on horizontal and vertical surfaces

Example 3: Prepare and serve food and drinks to customers
(Example of different products, methods and processes)

- Serve food and drinks to customers
- Prepare and serve food at the table
- Mix and serve drinks and manage the bar service

In the second example we see that the different types of solid facings are separated. This is because they require different methods and processes. This has also happened in the bakery-confectionery map. If we examine the map we will see that in area C we have separated producing products by baking and producing products by steaming and boiling. We have done this because the processes are quite different.

There is no absolute logic for determining how the classification rules operate in different occupations and sectors. There may be a number of different ways of classifying a statement - what is important is to identify the one which will make most sense to practitioners as a way of describing the functions of their occupation. To illustrate the fact that different classification rules may be appropriate for different purposes and occupations we can use an analogy.

If we wish to classify trees we could use a number of different classification rules. If we classify trees by the density of wood which they produce the classification would be:

Trees (hardwood
(
(softwood

The classification rule is: density of wood.

If, on the other hand, we classified by whether trees lose their leaves in winter, the classification would be:

Trees (deciduous
(
(coniferous

The classification rule is: whether leaves drop in winter.

The significance of this example is that both classifications are equally acceptable and logical - neither is right or wrong. However, each classification is useful for particular **purposes**. A cabinetmaker is interested in knowing whether wood is hard or soft because this affects the working qualities of the timber. A gardener is not particularly interested in this information. On the other hand, the gardener choosing a small avenue of trees to line a garden path may want to know whether the leaves fall in winter because s/he will have the task of clearing them up! By contrast, the cabinetmaker is unlikely to be interested in this feature - unless s/he happens to grow their own supplies of timber.

A functional mapping specialist may identify a classification rule which is logical and coherent - but which does not represent functions in the occupation. By contrast, occupational specialists may come up with a haphazard list of activities for which the specialist in functional analysis may be able to suggest a more logical and coherent structure which will help the overall coherence of the analysis.

Here is an example. In the map of the waiter occupation the statement 'prepare and serve food and drinks to customers' is analysed as:

B. Prepare and serve food and drinks to customers

- B1. Serve food and drinks to customers
- B2. Prepare and serve food at the table
- B3. Mix and serve drinks and manage the bar service

An analyst starting with the statement 'Prepare and serve food and drinks to customers' might first try an analysis based on different types of product – food and drinks:

- B1. Prepare and serve food to customers
- B2. Prepare and serve drinks to customers

An alternative might be an analysis based on different stages in the process - prepare, then serve:

- B1. Prepare food and drinks
- B2. Serve food and drinks to customers

Both of these analyses are inaccurate. In the first analysis, waiters do not 'prepare' food, except in special circumstances where certain dishes are prepared and even cooked at the table. Food preparation is the work of the cook or chef. Also, waiters are expected to serve both food and drinks, not just food.

In the second analysis, again we have waiters 'preparing' both food and drinks. Although waiters do prepare drinks, particularly if they are working in a bar, they generally do not prepare food. The second statement 'Serve food and drinks to customers' is fine – that is what waiters are expected to do.

So we need to go back to the occupational specialists to find out how the work activities are normally organised (taking into account the fact that some aspects of work organisation may be changing). When we do this we find that there are three work activities.

For most waiters there is the main work activity 'Serve food and drinks to customers'. But there are specialisations. Sometimes it will be necessary to prepare and serve food at the table. This happens commonly in some national restaurants (French restaurants are a good example).

Waiters are also expected to prepare drinks when they are working in a bar. But if they are working in a bar they have to do a number of other things as well to manage the bar service.

So we have three statements:

B1. Serve food and drinks to customers

B2. Prepare and serve food at the table

B3. Mix and serve drinks and manage the bar service

The first statement, B1, represents the work activity which is the most common. Statement B2 is less common but waiters need to be able to do this if required. Statement B3 covers bar work which most waiters will also be expected to do. Here we have changed the noun from 'prepare' to 'mix' because the main form of preparation for drinks is mixing. We have also added 'manage the bar service', which will involve preparing the bar for service, cleaning glasses, checking stock, etc.

It is often useful to try out different classification rules where it appears that a number of different analyses are possible and to take the analysis down to another stage of detail to see the subsequent effect of the rule - as we have done in the example above.

This process of experimentation and modification of stages in the analysis is referred to as **iteration** and is described in the next section.

Iteration

The identification of classification rules involves a series of decisions. The process of iteration (dictionary definition - 'to perform again, repeat') is integral to the development of the classification rules and occurs throughout the functional mapping and the subsequent analysis.

Often, different groups are given responsibilities for the development of different parts of the overall classification. However, this can lead to overlaps, duplication and other inconsistencies. Iteration offers the opportunity to retrace the analysis process and adjust the whole framework to maintain discrete statements, to give a more logical or acceptable structure and to regroup functions which have become separated by the analysis process.

Iteration requires that the developing analysis framework is seen as a draft - capable of modification and amendment at any stage. In general, a significant change in any statement may have an impact on other statements in the same grouping or on the title of the grouping. If the title changes this may, in turn, impact on other titles and so on.

Changes to titles and groupings are affected by two different, but interlinked, factors. They are technical issues and political issues.

Technical issues are to do with the overall logic and coherence of the analysis - whether the classification and classification rules used are logical and consistent and whether the analysis is concentrating on the separation of functions. The application of this factor avoids the listing of functions which relate to existing job descriptions and activities.

Political issues are to do with what is likely to be acceptable and credible within the occupational sector. This can result in the analysis framework being deliberately distorted to place certain statements in a different order or to keep descriptions which are so familiar in the occupational sector that the analysis would lack credibility if they were changed. By contrast, changes can also be made to identify anticipated future requirements which are not currently widespread.

Further stages of analysis

The combined process of classification and iteration continues until a level of detail is reached which describes an outcome which will become the title of a module in the vocational education and training standard - which is described in the following section.

Section 3: Vocational Education and Training Standards

Standards for the modern economy

When the functional map is complete we will have a number of statements which give an overall structure for the content of the vocational education and training standard. These statements, remember, describe what people have to achieve at work. They do not claim to fit exactly with people's jobs. The purpose of the vocational education and training standard is to provide a framework for the design of vocational education and training programmes – and vocational education and training programmes need to be broader than specific jobs to give labour market flexibility.

We have already discussed vocational education and training standards briefly in Section 1. An example of a complete module from a vocational education and training standard is shown in Annex 1 and here is a reminder of the three components of the standard.

The question:	The specification which answers the question:
What does the student need to be able to do in employment?	The employment specification
What does the student need to learn to be effective in employment?	The learning specification (the curriculum)
How will we know what the student has learned and is able to do in employment?	The assessment specification

The first thing we will develop is the full **employment specification** for each module, which starts with the most detailed statements from the functional map. These are the titles of the vocational education and training standard. But before we start to fill in the detail, we need to be quite clear about what we are trying to achieve with the vocational education and training standards.

As we have already pointed out, there are major changes in the world economy which the vocational education and training system must respond to in order to develop the levels of competence needed in employment. Many of these changes require a broader approach to both the definition of work activities and the design of vocational education and training programmes – quite simply, people are now expected to do more than narrow tasks and follow instructions.

New employment requirements – The skilled worker

It is difficult to be precise about the new requirements of employment, but there are a number of methods and models which are available which allow us to describe these new needs in a useful way. The first of these is the definition of the 'skilled worker'. A skilled worker, traditionally, was a person who had undertaken a period of structured training in their occupation – often associated with an apprenticeship. Such a person is normally 'qualified' – that is, they have a certificate which describes the occupation they have been trained in, the period of training and the 'level' of skill obtained (in most European countries a skilled worker is at level 3 in the scale of levels). Such systems still exist throughout the world.

However, if we need an international definition of a skilled worker we cannot rely on the particular system of any one country. Nor can we rely on some of the criteria which are used to recognise skilled workers – like the amount of time they are in training, the type of school they attend etc. We cannot do this internationally because these criteria vary.

In keeping with the theme of this manual we have developed a description of a skilled worker in a modern economy based on descriptions of what a skilled person is **expected to be able to do** in employment, the outcomes they achieve. We have drawn together this description from approaches used in European countries, including the Netherlands, Ireland, Germany, France and the UK. This is a summary of what a skilled worker is expected to be able to do.

Figure 17: The skilled worker

The skilled worker: A person who is able to meet the technical requirements of a defined occupational area (field, occupation, trade) and:

- Identify resource needs and access, gather, analyse, distribute and interpret information and data
- Plan their work to meet the needs of the user, including preparation, determining methods and sequences, and quality requirements
- Monitor their own performance for quality, correct any defects and revise working methods
- Take responsibility for passing on their work to the next stage in the process

In addition, the skilled worker is able to:

- Work co-operatively with their colleagues in a work team
- Communicate effectively with those with whom they work and those who are affected by their work
- Solve technical problems which occur within their occupational area
- Make effective judgements and decisions which are within their responsibility
- Make suggestions for improvements in working methods and processes
- Adapt and change to new and different circumstances by willingly learning new knowledge, skills and abilities
- Work in a manner which is safe to both themselves and others in the work environment
- Recognise and work within social and occupational values and ethics

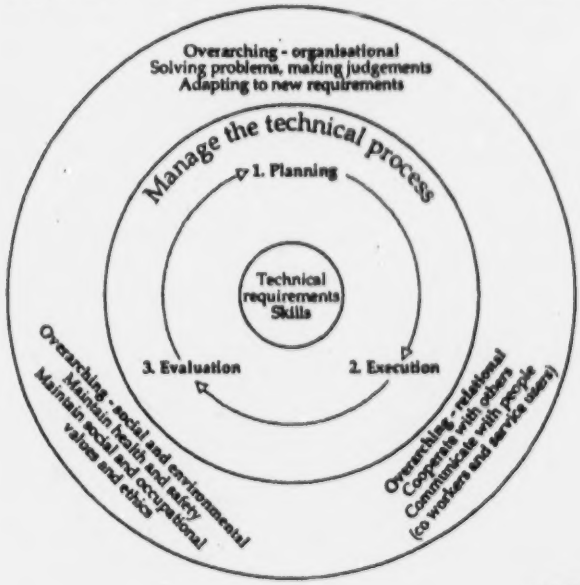
This description is quite demanding and it is possible that both employers and vocational education and training professionals may claim that this is far more than is currently expected in the labour market. In some countries, that may be so. But this model of the skilled worker represents an international trend and if it does not represent existing labour market requirements, then it will do in the future.

If we examine this description we will see that it has five parts.

1. The first requirement is that the person can meet the **technical requirements** – the 'skills' which are specific to the occupation. This will be different in each occupation. In engineering, the technical requirements will include engineering machining, fitting and assembly of components. In retail services it will include describing products, managing stock rotation and processing cash transactions. In tourism it will include guiding visitors, planning itineraries and processing foreign exchange.
2. The second requirement is that people have to **manage the work process**. These are the five items which follow from the technical requirements. People are expected to identify their resource needs, plan their work, monitor their quality, revise working methods and pass on their work.
3. The third requirement is that people have to develop good communication **relationships** with the people with whom they work. These are the first two items of the second list. They are expected to work co-operatively and communicate effectively with other people.
4. The fourth requirement is that people are expected to contribute to the **organisation of work** by solving problems, making judgements, suggesting improvements and adapting as work requirements change.
5. The fifth and final requirement is that people should recognise **social and environmental responsibilities** by working safely and ethically.

We can represent this list slightly differently as in the diagram below.

Figure 18: The expectation of the skilled person



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In the inner circle we have the technical requirements and skills which is the 'core' of occupational competence. Surrounding this we have the management of the technical processes broken into three stages - planning, execution and evaluation. The outer circle shows the three 'overarching' expectations. They are called 'overarching' because they apply to all the technical requirements and the management of the technical process. So, for example, all parts of the technical process involve working safely. At any stage the skilled person might have to solve problems and make judgements if things go wrong.

In order to properly represent the modern requirements for a skilled person, we need to make sure that each of these requirements is in the vocational training standard. We will examine the ways in which we can do this later in this section.

Developing the employment specification

We now have our starting point - the statements from the functional map - and a reminder that we need to develop broad vocational education and training standards to meet the requirements of employment. Now we can look at the process of developing the standard in detail.

First we will look at the overall format of a module in a standard which is shown below.

Figure 19: The format of a module

<table>
<tr><th colspan="5">The key purpose of the occupation and the title of the module</th></tr>
<tr><th colspan="2">This is the employment specification</th><th colspan="2">This is the learning specification</th><th>This is the assessment specification</th></tr>
<tr><td>The performance requirements</td><td>The range</td><td>The skills the student needs to learn to do this</td><td>The knowledge the student needs to learn to do this</td><td>The evidence needed to demonstrate competence</td></tr>
</table>

This format is used for all the modules in the vocational education and training standard. The module has a title, which is taken from the most detailed level of the functional map. It is also helpful to repeat the key purpose of the occupation. Following the title are three sections which represent the three specifications - employment, learning and assessment. The employment and learning specifications each have two sections. In the employment specification the two columns are labelled 'the performance requirements' and 'the range'. In the learning specification the knowledge and skills have been separated. Since we are concentrating on the employment specification we need to describe the performance requirements and range in a little more detail.

The **performance requirements** describe what has to be achieved, in employment, to meet the outcomes described by the title of the standard. These performance requirements are an extension of the functional analysis process. As before, they are phrased so that they do not describe specific tools, equipment or methods.

The second column, the **range** describes in more detail any variations, tools, equipment, materials or methods which are needed to achieve they performance requirements described in column 1. This column exists for two reasons:

1. The range column can be used to introduce changes in the standard as new technology, methods or processes are introduced. The performance requirement stays the same, but the range changes. Here is an example from the standard for a waiter. This part of the process describes taking payments. Imagine that this standard was developed 20 years ago.

The performance requirements	The range
Take payments, check authenticity and present the receipt and any change to the customer	Payments: cash; cheque

Notice that the performance requirement does not say how payments can be made. This is stated in the range – the common methods for making payment 20 years ago were cash and cheques. Now look at the present day version.

The performance requirements	The range
Take payments, check authenticity and present the receipt and any change to the customer	Payments: cash; cheque, credit/charge card, account

We have added credit and debit cards and accounts to the range – but the performance requirement stays the same, the way in which it is achieved is different. This means that we can make rapid changes to the standard. You will also notice that because of the way in which this performance requirement is written it could be used for any occupation where payments are taken from customers – e.g. retail occupations, other service occupations.

2. The range column can also be changed to describe closely associated activities and occupations. Here is an extract from a standard for finishing the wooden parts of a room (construction joinery).

The performance requirements	The range
finish the surface to the required degree of smoothness and apply an appropriate surface coating	Methods of finishing: sanding, polishing Surface finishes: paint, varnish, polish Methods of application: hand brush, hand application, spraying

Here is the same Performance Requirement with the Range adapted for the finishing of a plastered wall.

The performance requirements	The range
finish the surface to the required degree of smoothness and apply an appropriate surface coating	Methods of finishing: skimming, spraying Surface finishes: plaster, composite materials Methods of application: hand trowel and float, spraying

In this example, the same performance requirements can be used for a different occupation by making changes to the range. This has two advantages. First it speeds up the development process and second it encourages consistency in developing standards.

Now that we are clear about the overall format of the vocational education and training standard we can look at each part of the employment specification in detail.

The title of the module

The titles of the modules are the most detailed statements from the functional map. As we have already said, these statements follow a general pattern:

- the statement must describe an outcome (the result of activity) in performance terms - this is achieved by using a **verb** (or verbs) which describes the action or behaviour which will produce the outcome;
- the statement must describe the focus of the action – so we need a **noun** or nouns to follow the verb;
- if necessary for clarity, we must also describe any **conditions** which qualify the action.

We need this structure because the vocational education and training standard will be used by many different people if we have designed it correctly. Students will want to know what they will learn. Teachers need to design lessons. Employers will want to knows what students have been taught and what they can do. The title of the standard has a message for all these people and it needs to make perfect sense to them. If we are in the construction industry and talk about 'design', we will all know what we mean. But somebody from another occupation will not – and will ask 'design what?'.

The performance requirements

We now have a title for our module – and now the development work really starts! In this section we will take the title of the module and describe in detail what is expected in employment – taking into account the things we know about the requirements of employment:

- We only include best examples of current practice – we are not defining the 'average';
- We may need to include things which are not necessarily happening now, but also those aspects which are important for the future;

We have already looked at the overall structure of a standard and an extract from the module which is shown in full in Annex 1. Here is an extract.

Figure 20: An extract from a module from a vocational education and training standard

The module (title): Serve food and drinks to customers

The performance requirements:

(a) welcome customers politely, take and store coats and other personal items

(b) check reservations, offer options where tables are not available and show customers to a table

(c) take orders for drinks

(d) take orders for food, explain menu items accurately, inform customers about special dishes and advise on customer choice when asked to do so

(e) pass orders on to the kitchen and monitor the progress of the preparation of dishes

(f) collect orders from the kitchen and transport and serve dishes safely, politely and hygienically

(g) clear tables promptly, replace and lay the required table service for each course

(h) respond promptly to requests from customers

(i) assist customer as they are leaving

(j) re-lay tables for service

This is the same functional analysis process, but here it is applied to each module.

These performance requirements describe the technical requirements and the technical process – as we described in the section on the skilled worker. In this case we imagine the technical process involved in serving food and drinks. It will involve greeting the customer, seating them, taking orders, delivering the food, re-laying tables. In this case we have a cyclical process because this work process will repeat for every customer, but this will not be the same for all modules.

We can use the 'skilled person' description to check the content of the technical requirement. In Figure 18 we can select the 'execution' box and see if we have included all these stages.

Figure 21: The technical process and the performance requirements

Stage in the technical process	Outcome
Prepare the workplace	(g) lay the required table service for each course (j) re-lay tables for service
Start the process	(a) welcome customers politely, take and store coats and other personal items (b) check reservations, offer options where tables are not available and show customers to a table (c) take orders for drinks (d) take orders for food, explain menu items accurately, inform customers about special dishes and advise on customer choice when asked to do so

Stage in the technical process	Outcome
Control the process	(f) collect orders from the kitchen and transport and serve dishes safely, politely and hygienically (g) clear tables promptly, replace and lay the required table service for each course (h) respond promptly to requests from customers
Monitor quality	(e) ... monitor the progress of the preparation of dishes
Finish/pass on to the next stage	(e) pass orders on to the kitchen ... (i) assist customer as they are leaving

Remember that we are not trying to describe the jobs in specific enterprises. Some employers may say that their waiters do not do all this - the head waiter greets customers, the wine waiter takes drinks orders. Some employers, for instance in small family businesses, may say that their waiters do far more - they may also help out in the kitchen, reconcile the takings, bank the takings etc. None of this is important, because we are defining the **function** of serving food and drinks, not the job of a specific waiter.

The structure of each sentence follows the familiar pattern. We do not specify any tools, equipment, materials or methods in the performance requirements, we are still concentrating on **what** needs to happen, not **how**. But there are differences between these sentences and the ones we have developed previously. The differences are:

1. We have grouped together some of the performance requirements - for example in performance requirement (a) we describe welcoming customers politely, taking and storing coats and other personal items - two actions grouped together. We group them because they are all required for the process of 'welcoming customers'.

2. Some of the performance requirements have an additional phrase which sets a particular standard of performance. For example we welcome customers 'politely', we explain menu items 'accurately'. These are called 'evaluative phrases' and they are used to highlight critical aspects of performance. The outcomes highlighted in this way in this Module are:

   (a) welcome customers **politely**

   (d) explain menu items **accurately**, ... advise on customer choice **when asked to do so**

   (f) transport and serve dishes **safely, politely and hygienically**

   (g) clear tables **promptly**, replace and lay the **required table service** for each course

   (h) respond **promptly** to requests from customers

It is for those in employment to identify those critical aspects of performance which need to be qualified and highlighted in this way.

An important point to notice is that there are two ways of adding an evaluative phrase. The first involves using an adverb to qualify the verb - as in:

- welcome customers **politely**
- explain menu items **accurately**

The second method is to describe circumstances in which an action either should or should not occur - as in:

- advise on customer choice **when asked to do so**

Performance requirements – Common mistakes

1. Describing all performance requirements as 'correct' – for example:
   - explaining menu items correctly
   - transporting and serving meals correctly
   - welcoming customers correctly

The word 'correct' means that there is only one way of doing something. We are not describing standards for robots who simply follow orders. Of course, performance must be 'correct' in the sense that it meets the required standards – but there are many other terms we can use to make the standard clearer – 'accurately', 'politely', 'safely' etc.

2. Referencing the performance requirements to the procedures of an organisation – for example:
   - welcome customers according to organisational procedures
   - organisational procedures are followed to explain menu items
   - transporting and serving meals according to organisational procedures and instructions

This happens because of a fundamental misunderstanding of the nature of standards - which is that they are independent of the methods and procedures which individual organisations specify. Referring to organisational procedures do not set national standards.

Referencing to other standards is acceptable if external standards, like legislation, national or international conventions or codes of practice already exist.

3. Offering options, alternatives or conditions – for example:
   - take orders for food, explain menu items accurately, inform customers about special dishes and/or advise on customer choice when appropriate
   - clear tables promptly, and where necessary, replace and lay the required table service for each course
   - take payments, check authenticity and present the receipt and/or any change to the customer

There are a number of simple rules to overcome this problem:

- if you are tempted to use 'and/or', simply change to 'and';
- if there are real alternatives or options, develop separate outcomes for each one so change 'clear tables promptly, and where necessary, replace and lay the required table service for each course' to:
  - clear tables promptly
  - for intermediate courses, replace and lay the required table service
  - if the outcome refers to a contingency, phrase it to describe what needs to occur **when** it happens, not **if** it happens – e.g. change 'advise on customer choice when appropriate' to 'advise on customer choice when asked to do so'.

The range

We now examine the final part of the employment specification - the range . The range column is used to describe the specific technology, methods or processes which are described generally in the performance requirements - they make the general statement specific to the occupation. The range column is also used to show the range of different circumstances in which an experienced and skilled person is expected to be competent. Here is an example from the module in Annex 1.

Figure 22: The performance requirements and the range - Example 1

The performance requirements		The range
(a)	Welcome customers politely, take and store coats and other personal items	Customers: individuals; groups; special needs (e.g. disability) Storage of: garments; bags, briefcases, valuables
(b)	Check reservations, offer options where tables are not available and show customers to a table	Options: waiting for a table to clear; later reservation; suggesting an alternative restaurant
(c)	Take orders for drinks	
(d)	Take orders for food, explain menu items accurately, inform customers about special dishes and advise on customer choice when asked to do so	Taking orders: for passing on to the kitchen; personal service (e.g. sweet trolley, cheese board)

In these examples, we have described a range of different circumstances to which a skilled person may need to respond. So in performance requirement (a), the skilled person is expected to be able to deal with customers who have special needs. These are separated because different skills and methods will be needed.

But the column is also used to specify technology and methods. Here is another example which we have looked at before.

Figure 23: The performance requirements and the range - Example 2

The performance requirements	The range
Finish the surface to the required degree of smoothness and apply an appropriate surface coating	Methods of finishing: skimming, spraying Surface finishes: plaster, composite materials Methods of application: hand trowel and float, spraying

In this example the column has been used to specify what methods, materials and tools are used.

We develop this column by asking a number of questions - which are:

- Are there particular tools and equipment which are used to do this?
- Are particular materials used?
- Are there specific methods and processes which are used?
- Are there variations which would require different skills, methods or processes?

We complete the column bearing in mind that we are describing broad outcomes, not just narrow tasks. So in the example describing finishing surfaces, we describe the requirements of a flexible, skilled person by specifying different methods of finishing and application - not just one.

Section 4: Standards, overarching requirements and levels

Completing the vocational education and training standard

So far, we have looked at a single module 'serve food and drinks to customers'. This module forms part of the occupation of restaurant waiter. But even this single module may be broader than some employers require – as we have said above, some employers may not want all waiters to serve drinks as well as food. But if we include any less in the vocational education and training standard it becomes difficult to justify a vocational education and training programme or a certificate and we will certainly fall below the European consensus of what a skilled worker is expected to do.

If we look back at the functional map for the waiter we will see that there are seven modules in all:

- Prepare a restaurant for service
- Plan and prepare for special events
- Serve food and drinks to customers
- Prepare and serve food at the table
- Mix and serve drinks and manage the bar service
- Take payments for food and drinks
- Reconcile and process accounts

These are all parts of the technical process and, taken together, the modules cover the three stages of the technical process described in Figure 18 of planning, execution and evaluation.

Overarching requirements

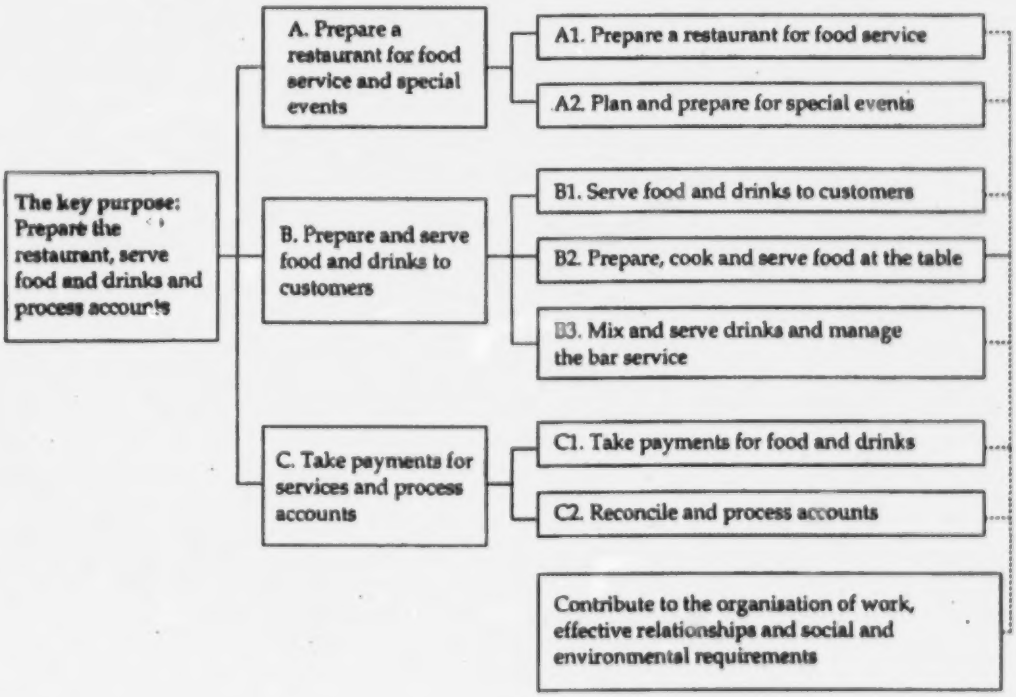
So far we have developed a module which describes one of the seven technical processes in the vocational education and training standard. But as we have said before, there are other requirements which we have described as 'overarching'. These requirements are to do with the **organisation** of work, **relationships** with other people in the workplace and **social** and **environmental** responsibilities.

It would be possible to add these requirements to each of the modules – but this would be repetitive because the overarching requirements may apply to many – or all of the modules. For example, anybody working in food preparation and service needs to maintain standards of hygiene in food preparation and service areas. This applies to almost all the modules in this vocational education and training standard. In preparing the restaurant for service and special events, the waiter needs to check that service equipment, cutlery and crockery is clean. They need to make sure that cooked and raw meats are separated for buffets and that food is properly covered. When serving food they also need to check that serving dishes are clean, that food is not contaminated when being transported, that dishes on food trolleys are covered.

Because these requirements can apply to many of the modules, the most convenient way of describing them is to develop a separate module within the vocational education and training standard which contains all the overarching requirements. When we deliver the vocational education and training standard within the vocational education and training programme, each 'technical' module is delivered together with the 'overarching' module and the requirements of the overarching module are interpreted in the context of the technical module.

This means that we need to add this module to the functional map. The module is called 'contribute to the organisation of work, effective relationships and social and environmental requirements'. This is how we add it to the map:

Figure 24: Adding the overarching module to the functional map


The key purpose: Prepare the restaurant, serve food and drinks and process accounts
A. Prepare a restaurant for food service and special events
A1. Prepare a restaurant for food service
A2. Plan and prepare for special events
B. Prepare and serve food and drinks to customers
B1. Serve food and drinks to customers
B2. Prepare, cook and serve food at the table
B3. Mix and serve drinks and manage the bar service
C. Take payments for services and process accounts
C1. Take payments for food and drinks
C2. Reconcile and process accounts
Contribute to the organisation of work, effective relationships and social and environmental requirements

The overarching module does not need a code because it may apply to all the modules. We show this by adding a dotted line connecting this module to all the technical modules.

Here are the performance requirements. The complete module is shown in Annex 2.

Figure 25: An extract from the module: contribute to the organisation of work, effective relationships and social and environmental requirements

The module (title): Contribute to the organisation of work, effective relationships and social and environmental requirements

The performance requirements:

Overarching requirements, organisational:

(a) balance the needs and requirements of different customers when the restaurant is busy

(b) respond sympathetically and politely to contingencies and call somebody in authority if the contingency is not resolved

(c) monitor the progress of customer service, clearing and responding promptly to customer signals as required

(d) evaluate the quality of service and recommend improvements

Overarching requirements, relational:

(e) maintain good working relationships with other staff

Overarching requirements, social and environmental:

(f) maintain the safety and hygiene of the food service areas

The first four statements are organisational – anticipating and solving problems, checking progress, evaluating quality and recommending improvements. The fifth statement is relational and the sixth is social and environmental. Remember that these outcomes may apply to many of the technical modules.

There are some examples of performance requirements which appear 'relational' in the technical module – but these are part of the technical process in a restaurant. For example, performance requirement (h) 'respond promptly to requests from customers' describes what happens during a meal when a customer needs something or wants their bill. It will not apply to 'preparing the restaurant for food service' – so it is specific to the module 'serve food and drinks to customers'.

But statement performance requirement (e) in the overarching module, 'maintain good working relationships with other staff' has to be applied all the time as the waiter interacts with other waiters, the head waiter, kitchen staff etc. It applies to all the technical modules.

Equally, 'hygiene' is mentioned in the technical module – performance requirement (f) is 'collect orders from the kitchen and transport and serve dishes safely, politely and **hygienically**'. Again, this is specific to this module. However, in performance requirement (f) of the overarching module we are describing something which could affect all the technical processes. This will involve noticing and clearing spillages, keeping serving areas clean, separating raw and cooked foods etc.

Summary and conclusion

Our vocational education and training standard is now almost complete. The standard has both technical and overarching modules which, taken together, cover all the criteria for a skilled worker. From the employment specification we can identify directly the knowledge and skills which the student needs to learn (the learning specification) and the assessment specification. This is shown in the two examples in Annex 1. But this part of the standard is still quite general. It is now for our professional colleagues in vocational education and training to use this general description to develop the detailed curriculum which will be used to enable students to meet the requirements of the employment specification.

Remember, we develop these standards together with the social partners, taking into account the future needs of our economy and international trends. The structure of the modules helps us to update the standard as the economy and employment requirements change. If we identify modifications to work practice and technology we can make changes to the range. If new requirements emerge, we can modify and add performance requirements. If there are major changes we can adapt or add new modules. The basis of this method is flexibility in response to changes in the labour market.

The level of vocational education and training standards

The vocational education and training standard we have developed has been benchmarked to the European concept of the skilled person – the equivalent of Level 3 in most European systems. But we need to develop standards at higher and lower levels to recognise the different types of work activities and jobs and to encourage progressions for students. So we need to discuss the level of vocational training standards.

The problems is that there are different ways to describe level. Here are some of the concepts which are used:

- The level of general ability of the person
- The length of education and training involved
- The type of institution in which education and training takes place
- The grade of job or work which the person is able to do

In this manual we have used another concept of level. We describe the range of outcomes which a person is expected to achieve and which we have called the 'skilled person', the equivalent to the European level 3. This is the approach to levels which we will continue to use.

One way of looking at differences in level is to consider the characteristics of work activities which are associated with different levels. Here is a list of them:

- Complexity of work activities
- Range of variations
- Personal responsibility and autonomy
- Personal accountability
- Collaboration with others

- Responsibility for others
- The requirement to apply principles and techniques
- Allocation of resources

In general, some of these characteristics are absent at certain levels and some increase as the level increases. Here is a general framework which shows, very broadly, how these characteristics are usually associated with different occupational levels.

Figure 26: Characteristics associated with level

Characteristic	Level 1	Level 2	Level 3 (Skilled person)	Level 4	Level 5
Complexity of work activities	Low	Low to moderate	High	High	Extremely complex
Range of variations	Low	Low to moderate	Moderate to high	High	High
Personal responsibility and autonomy	Very little	Some	Complete within technical responsibilities	High	High
Personal accountability	Very little	Some	Complete within technical responsibilities	High	High
Collaboration with others	Some	Some	High	High	High
Responsibility for others	None	None	Some (supervisory)	Moderate	High
The requirement to apply principles and techniques	None	Very little	Moderate	High	High
Allocation of resources	None	Very little	Some/ Moderate	Moderate	High

This table should only be taken as a starting point. In different occupations and sectors, the level applied to the different characteristics will be quite different.

We have started our development at level 3, but we recognise that some occupations are at levels above and below level 3 and some people will need to start their development at a less demanding level. So, within the vocational education and training system we need to develop vocational education and training standards and programmes at different levels and then encourage people to progress through the different levels until they reach the one which matches their personal potential.

Reducing level

First we can consider how we would reduce the level of the standards – from level 3 to level 2 and even to level 1. This could be done by:

- reducing the number of modules required for the vocational education and training standard;
- splitting modules into 'smaller' groups of performance requirements;
- removing modules or performance requirements associated with planning and autonomy;
- reducing the number of performance requirements within a module;
- reducing the number of variations in the range within a module.

Here are examples related to the vocational education and training standards for the waiter.

First we could reduce the level of the vocational education and training standard by removing modules. We could remove modules C1 and C2, which are to do with processing payments, which is associated with personal responsibility. We could then change the key purpose of the vocational education and training standard to 'prepare the restaurant and serve food and drinks'.

Second, we could split modules and remove parts of them. For example, we could split the module 'serve food and drinks to customers' into two:

- Serve food to customers
- Serve drinks to customers

We could then remove 'serve drinks to customers' for the lower level vocational education and training standard and change the key purpose to 'prepare the restaurant and serve food to customers'.

This is not an arbitrary activity. It will require consultation with those in employment to make judgements about how differences between jobs and grades are defined, using the matrix in Figure 26 as a guide.

Increasing level

To increase the level we need to take account of the different characteristics in the matrix in Figure 26. Increasing level is not just about more activities or greater range of variations.

There are three ways in which we may increase the level of an occupation – we have called them 'tracks':

Track 1: additional activities (breadth) – adding more modules to the vocational education and training standard

Track 2: increasing management and coordination of activity by adding modules describing operational and general management

Track 3: increased technical specialism (depth) by developing specialist modules

The first track is obvious. We add more modules to the standard to increase complexity and variation. We might also need to add outcomes associated with the characteristic (from Figure 26), 'application of principles and techniques'.

The second track may involve the two types of managerial function - operational management and organisational management. This would require adding characteristics from Figure 26:

- Personal responsibility and autonomy
- Personal accountability
- Collaboration with others
- Responsibility for others
- Allocation of resources

Often, increased technical specialism also carries increased responsibility for operational management - planning, resource identification and allocation etc. But it is not necessarily the case that increased technical responsibilities mean an increase in organisational management responsibilities. In fact, organisational management is in itself a series of technical specialisms (such as training and development, human resource management, accountancy etc).

Of course, there are many occupations in industry and service sectors where a technical function is combined with organisational management - so an engineer may have responsibilities for budgets, appraisal and selection of staff as well as technical engineering responsibilities.

If we apply this distinction between operational and organisational management to the three tracks identified above we get a simple matrix which shows which type of managerial function is associated with each track:

	operational management	organisational management
Track 1: additional technical activities	✓	✓
Track 2: increasing management and coordination	✓	✓
Track 3: increased technical specialism	✓	

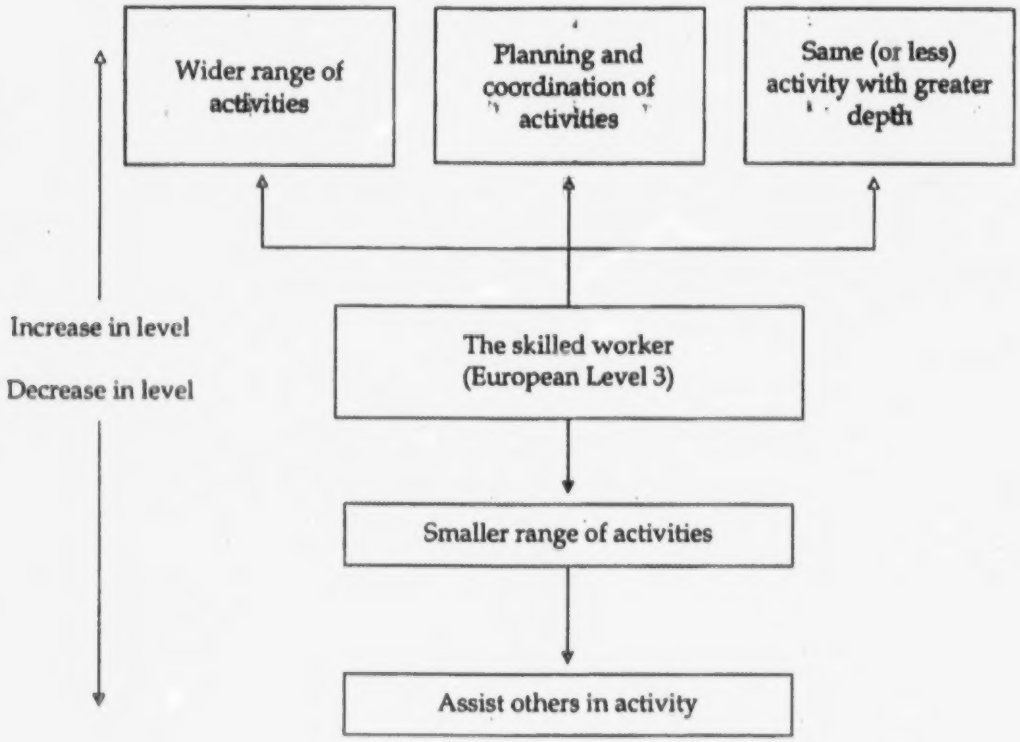
Track 1 offers two options. There are occupations which increase in technical breadth and have responsibilities for operational management – an executive chef, design engineers and IT system engineers would be examples. Some roles increase in technical breadth, and have operational and organisational management responsibilities. Restaurant managers would be an example.

Track 2 describes occupations in which some of the technical activities are replaced by managerial responsibilities. The knowledge associated with the technical functions is used to support planning and strategic decision making. Heads of departments and senior planning occupations are examples of this track.

Track 3 describes the technical specialist who has some operational responsibilities but little (or no) significant organisational management responsibility. Here we would need to develop specialist vocational education and training standards. Examples would be a specialised tour guide or a freelance site surveyor.

We can summarise both reduction and increase in levels with a diagram:

Figure 27: Different levels of vocational education and training standards


Wider range of activities
Planning and coordination of activities
Same (or less) activity with greater depth
Increase in level
Decrease in level
The skilled worker (European Level 3)
Smaller range of activities
Assist others in activity

Section 5: Evaluating Vocational Education and Training Standards

In Figure 18, we have suggested that the skilled person should be able to evaluate their own work and to make improvements. This is also true for people involved in setting vocational education and training standards - we are not exempt!

When evaluating the vocational education and training standards we have developed, we need to take three sets of evaluation criteria into account:

- what the standards are intended to achieve economically and socially (policy criteria);
- what the standards should be like (technical criteria);
- how the standards will be used in practice (implementation criteria).

Policy criteria

The policy criteria will vary depending on the focus and purpose of vocational education and training reform and the culture of each particular country. Typically, policy criteria include:

- commonality and coherence - the whole system needs to be coherent, integrated and should identify links between similar standards;
- breadth of competence and transferability - standards should be broad in scope and should incorporate outcomes which encourage people to transfer to different work activities and meet the challenges of new work activities;
- strategic and forward looking - standards should be based on current best practice and anticipated future requirements;
- access and equality of opportunity - participation in learning and the recognition of achievement has become a democratic right for all citizens.

Technical criteria

There are two areas where technical criteria can be applied:

- the functional map which describes the content of the standard;
- the structure of the modules within the standard.

Implementation criteria

For implementation, there are two ways in which the vocational education and training standards can be presented to give practical help to those who will have to use them in practice:

- the structure and format of the standards;
- the language used to describe the standards;

These points can be used to develop clear criteria for standards and provide a complete framework for evaluation. The evaluation framework is shown below.

An evaluation framework for vocational education and training standards

A. POLICY CRITERIA

Policy criteria are concerned with the function and purpose of vocational education and training standards - what they are intended to achieve

A1 standards and programmes contain all the components of the 'skilled person' framework.

A2 standards are designed to encourage flexibility and adaptability by describing the ability to work in a variety of circumstances (range) and being able to respond to changes in work practices.

A3 standards incorporate future requirements in technology, legislation, market and customer requirements and work organisation.

A4 standards clearly describe quality improvement functions and responsibilities.

A5 standards are benchmarks for excellence, reflecting best practice in the occupation.

A6 standards do not create any artificial barriers to access and they encourage participation by disadvantaged and under-represented groups.

A7 where standards are restricted to particular groups or individuals, there are valid and justifiable reasons for doing so.

A8 the overall framework of standards allows progression routes between different levels and related occupational areas.

B. TECHNICAL CRITERIA

Technical criteria are concerned with what vocational education and training standards should be like - their structure, format and content

B1 the standard is represented as a functional map with a key purpose statement analysed into statements which are the titles for Modules. Each Module describes a complete work activity.

B2 modules contain clear and precise descriptions of the performance requirements which have to be achieved.

B3 standards describe outcomes, not tasks, specific activities or jobs.

B4 standards should be of a size and scope which is realistic (neither too demanding nor too trivial).

B5 the performance requirements within each module do not specify the technology, materials or methods used.

B6 modules describe the range of circumstances and variations in technology, materials or methods, separated from the performance requirements.

C. *IMPLEMENTATION CRITERIA*

Implementation criteria are concerned with the ways in which standards are presented to users - and how they are intended to be used

C1 the presentation and layout of vocational education and training standards is logical, straightforward, self-explanatory and maximises access for users.

C2 the language of the standard can be interpreted by all potential users, including students and employers - although some users may require briefing and training on the purpose and structure of the standards and the language used to express them.

C3 the unnecessary use of technical language is avoided and any potentially confusing terms are referenced in a glossary.

Section 6: Annexes

There are four annexes:

Annex 1:	An example module from a vocational education and training standard: Serve food and drinks to customers
Annex 2:	The overarching module for the vocational education and training standard
Annex 3:	A matrix for tracking the type and impact of economic changes
Annex 4:	Verbs used in the titles of vocational education and training standards and modules
Annex 5:	Example functional maps and modules

Annex 1: An example 'technical' module

The key purpose of the vocational education and training standard: Prepare the restaurant, serve food and drinks and process accounts

The Module: Serve food and drinks to customers

←——This is the employment specification ——→		←—— This is the learning specification ——→		This is the assessment ←— specification —→
The performance requirements	**The range**	**The skills the student needs to learn to do this**	**The knowledge the student needs to learn to do this**	**The evidence needed to demonstrate competence ****
(a) Welcome customers politely, take and store coats and other personal items	Customers: individuals; groups; special needs (e.g. disability) Storage of: garments; bags, briefcases, valuables	Recognising and responding to customers' special needs Effective communication with customers	The characteristics and needs of different types of customer The principles of effective communication Storage of customer property and legal responsibilities	Customers (as stated in the range) welcomed politely and personal items stored State the principles of effective communication in dealing with customers
(b) Check reservations, offer options where tables are not available and show customers to a table	Options: waiting for a table to clear; later reservation; suggesting an alternative restaurant	Effective communication with customers Interpreting reservation books	The principles of effective communication Reservation systems	Reservation records Options offered as stated in the range
(c) Take orders for drinks		Clear and accurate recording of information	Types of drinks typically served in restaurants	Drinks orders taken
(d) Take orders for food, explain menu items accurately, inform customers about special dishes and advise on customer choice when asked to do so	Taking orders: for passing on to the kitchen; personal service (e.g. sweet trolley, cheese board)	Effective communication with customers Advising and explaining clearly Personal food service	The principles of effective communication Characteristics of dishes offered on the menu, including special items, regional dishes etc.	Food orders taken for all courses Menu items explained Personal food service as stated in the range

←——This is the employment specification ——→		←—— This is the learning specification ——→		This is the assessment ←—— specification ——→
The performance requirements	**The range**	**The skills the student needs to learn to do this**	**The knowledge the student needs to learn to do this**	**The evidence needed to demonstrate competence ****
(e) Pass orders on to the kitchen and monitor the progress of the preparation of dishes		Passing on information accurately Checking on progress	The principles of effective communication Kitchen procedures	Food orders passed on
(f) Collect orders from the kitchen and transport and serve dishes safely, politely and hygienically	Transporting: plates; trays; service trolleys	The use of food transport equipment Carry multiple plates	The types and characteristics of food transport equipment Hygiene and safety regulations	Food served for all courses and transported as stated in the range State the hygiene and safety regulations
(g) Clear tables promptly, replace and lay the required table service for each course	Table service: crockery; cutlery; glassware, accessories	Placing and positioning the table service	The different types of table service	Tables cleared promptly and re-laid as stated in the range
(h) Respond promptly to requests from customers		Effective communication with customers	The principles of effective communication	Responses to requests
(i) Assist customers as they are leaving	Assisting by: helping with coats; calling for taxis; advising on transport; giving directions	Effective communication with customers Advising and explaining clearly	The principles of effective communication	Customers assisted as stated in the range
(j) Re-lay tables for service	Service: crockery, cutlery, glassware, accessories	Laying tables for service	The different types of table service	Tables re-laid

** *Note: The assessment column identifies both what the student must do and the knowledge which must be tested. Descriptions of what the student must do – usually to produce something which will be inspected or observed - always start with a noun, e.g. 'tables', 'food'. The knowledge to be tested always starts with a verb, e.g. 'state'.*

The assessment specification does not describe methods of assessment – only what will be assessed. How the assessed items are produced and how the knowledge is tested will need to be determined locally.

Annex 2: An example 'overarching' module

The key purpose of the vocational education and training standard: Prepare the restaurant, serve food and drinks and process accounts

The module: Contribute to the organisation of work, effective relationships and social and environmental requirements

←——This is the employment specification ——→		←—— This is the learning specification ——→		This is the assessment ←— specification —→
The performance requirements	**The range**	**The skills the student needs to learn to do this**	**The knowledge the student needs to learn to do this**	**The evidence needed to demonstrate competence ****
Overarching requirements, organisational:				
(a) Balance the needs and requirements of different customers when the restaurant is busy	Balancing by: serving in order of arrival/ordering; explaining if there is a delay	Advising and explaining clearly	The principles of effective communication	Interactions with customers in busy conditions
(b) Respond sympathetically and politely to contingencies and call somebody in authority if the contingency is not resolved	Contingencies: accidents; complaints about the quality of food; complaints about the quality of service	Recognising contingencies Effective communication with customers Advising and explaining clearly Resolving conflicts and disputes	The principles of effective communication	Contingencies, as stated in the range, recognised and resolved Explanations given to customers
(c) Monitor the progress of customer service, clearing and responding promptly to customer signals	Service: restaurant service, bar service	Recognising customer needs	The principles of effective communication	Interactions in the restaurant as stated in the performance requirements

← This is the employment specification →		← This is the learning specification →		This is the assessment ← specification →
The performance requirements	**The range**	**The skills the student needs to learn to do this**	**The knowledge the student needs to learn to do this**	**The evidence needed to demonstrate competence ****
(d) Evaluate the quality of service and recommend improvements	Service: restaurant service, bar service Improvements to: service quality, food quality, work processes	Identifying areas for quality improvement Producing written recommendations	The analysis and evaluation of quality standards Systems for controlling and assuring quality of products and service	Quality issues identified and recommendations produced Analyse and propose solutions to quality problems Identify and evaluate the systems used for assuring quality
Overarching requirements, relational:				
(e) Maintain good working relationships with other staff	Staff: waiters; bar staff; kitchen staff; front of house	Effective communication with colleagues	The principles of effective communication	Interactions with other staff State the principles of effective communication in dealing with other staff
Overarching requirements, social and environmental:				
(f) Maintain the safety and hygiene of the food service areas		Methods and techniques of cleaning to the required levels of cleanliness and hygiene Hygienic working practices Noticing and reporting breaches in health and safety regulation	Hygiene and safety regulations Cleaning methods	Working practices which are safe and hygienic State the hygiene and safety regulations apply to food service

** *Note: The assessment column identifies both what the student must do and the knowledge which must be tested. Descriptions of what the student must do – usually to produce something which will be inspected or observed - always start with a noun, e.g. 'interactions', 'explanations'. The knowledge to be tested always starts with a verb, e.g. 'state', 'analyse'.*

The assessment specification does not describe methods of assessment – only what will be assessed. How the assessed items are produced and how the knowledge is tested will need to be determined locally.

Annex 3: Tracking the type and impact of economic changes

Changes in technology

Area of technology	Current requirements	Coming soon	In the future
Machinery and equipment			
Micro processor based technologies which affects communication, the processing of information and the use of multi-media			
The bio-technologies, including genetics			
Energy and the environment			
Materials			
Chemicals (including pharmaceuticals)			

Changes in regulations (including legal statutes and codes of practice)

Type of legislation	Current requirements	Coming soon	In the future
Health and safety			
Consumer protection			
Environmental protection			
Finance and auditing			
Introduction of ISO and other international standards			
Social legislation			
Vocational education and training legislation			

Changes in markets and customer requirements

Type of change	Current requirements	Coming soon	In the future
Internationalisation			
More direct customer contact			
Direct advice in selling roles			
Quality standards			

Changes in work organisation and organisational culture

Type of change	Current requirements	Coming soon	In the future
Management models and systems			
Decline in mass production systems			
Rate of innovation			
Core business philosophy			
The quality organisation			
Growth of women in employment			
Growth in self-employment			

Annex 4: Verbs used in the titles of vocational education and training standards

The verbs used in the titles and outcomes of vocational education and training standards provide important information to the users of the standards. In a functional analysis and a functional map, the verbs may be used to suggest subsequent stages of analysis - for example, a statement like 'prepare and present information to ...' may suggest classification into two statements 'prepare information ...' and 'present information ...'.

In the vocational education and training standard, the verbs in the title offer useful information about the 'content' of the standard. Many users of standards do not need the full detail of the vocational education and training standard - the employment, learning and assessment specifications - so the phrasing of the title should give a clear indication of the coverage and content of the standard.

For these reasons, it is important to choose the most accurate verb which best reflects the outcome which is being described. The verbs defined below are not intended to be exhaustive. There will be many verbs with a precise occupational meaning which may be used. However, it is useful to define all the verbs used within a set of vocational education and training standards to help users understand the focus and content of the standard.

In some languages, particularly English, care should be taken to avoid words which are ambiguous or which have different meanings.

Adapt	to modify or change
Adjust	to place in the correct relationship (usually applied to setting up equipment)
Advise	to recommend or suggest
Advocate	to speak on behalf of, to plead the cause of another
Agree	to form the same opinion
Allocate	to give a portion a share
Analyse	to separate into component parts
Apply	to put to use
Assemble	to put together the parts of ...
Assess	to decide the value of (usually information or evidence)
Assist	to offer or provide help
Audit	to review, examine and verify (specific meaning in accounting)
Brief	to instruct or provide information
Calculate	to count or reckon mathematically
Calibrate	to adjust (usually equipment or instruments) against a specification
Care	to look after, tend or nurse
Certify	to verify or confirm
Create	to originate or conceive
Chair	to manage the process of a meeting
Check	to compare against a specification
Coach	to instruct or tutor (usually one to one)
Collate	to bring together and place in order
Collect	to assemble (usually - information)
Commission	to identify and appoint others to perform a service
	to set up equipment and prepare it for use
Compare	to identify similarity or dissimilarity
Compile	to collect together written material
Conclude	to settle or arrange finally
Confirm	to ratify or verify
Constitute	to set up or establish
Contact	to get in touch with
Contribute	to share or participate in
Control	to regulate or act in authority
	to manage a process or operation

Convene	to assemble or call together (other people - usually a meeting)
Coordinate	to organise into common action
Create	to develop from new
Cultivate	to prepare soil for plants
Decide	to determine, to resolve
Defend	to guard, protect or maintain against attack
Define	to fix the bounds or limits of
Deploy	to place for a purpose, to place strategically
Design	to form a plan, to produce a graphical specification of an object (building, article of clothing etc)
Determine	to define limits, to identify, to decide, to resolve (in contracts)
Develop	to evolve to a more desirable state
Draft	to produce (drawings or text) in preliminary form
Draw up	to compose or put into shape (often associated with contracts)
Empower	to give power to, or share power with, to authorise
Enable	to provide with the means, knowledge or opportunity
Encourage	to help, inspire confidence
Enlist	to encourage cooperation
Establish	to set up or create, to place in a fixed position, to confirm
Estimate	to make a rough calculation usually without a measuring instrument
Evaluate	to determine the value of
Finalise	to put into final form, to complete
Formulate	to state or express in a clear or definite form
Identify	to find out, to establish identity
Implement	to put into practice, to introduce
Improve	to make better
Initiate	to begin or originate
Inform	to give knowledge to
Inspect	to examine
Instruct	to teach, to give guidance, to direct
Integrate	to make up parts into a whole
Interpret	to extract meaning from (usually text), to express in a different language
Investigate	to inquire or examine systematically
Issue	to put into circulation (usually documents), to give out for use
Justify	to prove or show to be right
Lead	to guide, to act in authority
Maintain	to preserve or retain in the same state
Match	to find an equal or counterpart
Modify	to change the form or quantity of
Monitor	to keep track of a process
Negotiate	to come to terms with others by agreeing
Obtain	to succeed in getting, to gain or acquire
Optimise	to achieve the best balance between two or more competing parts
Organise	to arrange by planning and coordination
Originate	to create or bring into being
Participate	to have a share or take part
Plan	to formulate a scheme or method to achieve an objective
Prepare	to make ready, to put together resources
Present	to introduce (information) formally
Prioritise	to place in order of rank or importance
Process	to engage in a series of operations or changes
Procure	to obtain (goods and services)
Produce	to bring into being
Programme	to plan a sequence of actions
Promote	to popularise, to advocate
Propose	to offer for consideration or acceptance
Protect	to shield from danger
Provide feedback	to return information to a source for control or alteration
Provide informatin	to offer facts and opinions to others

Recommend	to suggest as suitable for acceptance
Record	to account for events (usually in written form)
Recruit	to select and employ people
Regulate	to apply a control or rule
Repair	to return something to its optimum/working state
Report	to prepare and present an account, usually formally
Represent	to serve as an authorised delegate or agent
Research	to investigate systematically
Respond	to reply, answer
Review	to look back over events, to critically examine
Revise	to examine and correct, to make an improved version of
Schedule	to plan, timetable or programme
Secure	to establish in safety, to obtain good and services
Select	to choose one or more from several
Service	to perform duties and services
Set	to prescribe or assign
Set up	to make ready for use
Specify	to set down as a requirement
Store	to put away for future use
Summarise	to present a condensed version
Supply	to provide (goods or services)
Support	to promote the cause of, to provide resources
Sustain	to support, to maintain or keep going
Synthesise	to make a whole out of parts
Teach	to enable learning to take place
Test	to determine fitness for purpose
Train	to instruct and enable learning to take place
Validate	to ratify, to confirm
Verify	to assert or prove to be true
Welcome	to receive with kindness or pleasure

Annex 5: Example functional maps and modules

Introduction

These examples were produced by the participants at the seminar 'Occupational outcomes and employment requirements - How to reflect them within vocational education and training standards' held in Minsk in September 2000. The participants were:

Belarus
1. Mr V.M. Khassin
2. Mr V.Z. Aksenov
3. Mr E. Kalitsky
4. Mr E. N. Gonchar
5. Mrs T. P. Eremeeva
6. Mr M. Ilyin
7. Mrs L. Iakortseva
8. Mr A Sklyar

Georgia
9. Mr. A. Shalamberidze
10. Mr. M. Berdzenishvili

Kazakhtsan
11. Ms. D. Almagambetova
12. Ms. Sh. Dauletova

Kyrgyzstan
13. Ms. B. Jusupova
14. Ms. N.E. Vasilchikova

Moldova
15. Mr. Iu. Mocanu
16. Mr. A. Iurescu
17. Mr. V. Ostashov

Mongolia
18. Mr. S. Tsepil
19. Mr B. Sanduijav

Ukraine
20. Mr. V. Tomashenko
21. Ms. L. Yanevich

Uzbekistan
22. Mr. H. Rashidov
23. Mr. U. Inayatov

The seminar was based on the short version of the Manual 'Linking Vocational Education and Training Standards and Employment Requirements'. Participants were asked to read parts of the manual in advance of the seminar and to bring examples of vocational education and training standards from their own countries. One component of the seminar was a company visit to observe work processes and to interview practitioners, supervisors and managers. The group visited a brewery (private sector) and an electronics factory (public sector).

The seminar was led by Bob Mansfield and Hermann Schmidt with support from Arjen Deij of the European Training Foundation. The sessions of the seminar covered:

- the development of the functional map;
- the selection of one module from the map to develop the performance requirements and the range of applications
- the identification of the overarching requirements.

Participants worked in groups to prepare the example materials. Five examples were produced, three from materials brought by participants and two (brewing and electronic assembly) from the company visits.

The process of the seminar, which maximised the direct involvement of participants, was extremely effective. The outputs are extremely impressive. In three days the participants learned a new methodology and developed frameworks for vocational education and training standards for five occupational areas. It is important to note that the participants included three employers. Their comments on the outcomes of the seminar are shown below.

> For me as an employer, it is very clear that we need to introduce the conditions of the labour market in the standards. Therefore the methodology is extremely useful.
>
> *Natalia Vasilchikova (Milling plant, Kyrgyzstan)*
>
> We come to one document containing employment requirements, which will be called a standard. This is what we need. The president of our Confectionery Company 'Rahat' who took part in the project is aware of the results of the project is very interested. He is also president of the employers' union and will discuss the outcomes with other employers.
>
> *Sholpan Dauletova (Confectionery factory, Kazakhstan)*
>
> We need new standards for furniture makers. They should combine the more artistic skills of the wood cutter/sculpture-maker with carpeting skills, in order to understand and produce the mechanic parts of the furniture. The skilled worker is becoming multi-skilled as was explained by the experts. We will use the methodology that we learned here to design the employment requirements.
>
> *Andrei Iurescu (Furniture producer, Moldova)*

This seminar was the first full test of the International Vocational Education and Training Standard framework and the functional analysis methodology. The results are very positive. Vocational training experts and employers worked effectively together because they had a common language to describe the needs of employment.

It is quite clear from the outcome (the examples) that this approach has the potential to accelerate vocational education and training standards development in many countries. In separating out the employment specification it is possible to see how this part of the standard can transfer to different countries. Whilst the legislation, curriculum design models and institutional arrangements are different in each country, the employment specification, the foundation of the standard, can be shared.

It does not matter whether we are in Mongolia, Ukraine or Belarus; a welder needs to be able prepare the metal components for welding, prepare the welding equipment, weld the components, check for quality and correct any faults and finish and pack the completed article. Once this outline of the standard has been developed it does not need to be developed again in each country. The content and detail will need to be kept up to date as technology and methods change – but these changes are international – and can be agreed and included at an international level.

Our colleagues from the New Independent States and Mongolia have started a process which can meet the challenge of the rapid changes which are impacting on their economies. They have taken a very simple idea – to define what is required in employment as the starting point of a vocational education and training standard – and made it into a reality. I congratulate them and thank my colleagues Hermann Schmidt, Arjen Deij and Thomas Schröder for enabling me to be a part of this exciting development.

Bob Mansfield
October 2000

The examples

Functional maps

The functional map is a broad outline of the main content of the vocational education and training standard. Starting with a conventional occupational description (e.g. welder) the participants first defined the 'key purpose' of the occupation – by asking, 'what do welders do?'.

From the key purpose statement, the first stage of analysis separates out the major functions of the occupation. Each major function is further analysed into modules, which will be the focus for the detailed development of the employment specification. Each group found that, particularly with industrial processes, the production cycle had common components which usually take the form of:

- Preparing the workplace, tools, equipment and materials
- Controlling the production process
- Checking and correcting faults
- Finishing off the processes (passing on to the next stage, applying finishes, packing etc)

This simple four-stage cycle can be used to develop the outline structure for many occupations.

Example 1: Functional map of the standard for a welder

The key purpose	Major functions	Modules
Join metal components by electro-gas welding	A Prepare the components for welding	A1 Check the quality of the components
		A2 Check the quality of the welding materials
	B Prepare the welding equipment and the working environment	B1 Prepare the welding equipment
		B2 Prepare and position protective clothing and screens
	C Weld the components	C1 Prepare the surfaces to be welded
		C2 Weld the components
	D Check the quality of the welds and correct faults and defects	D1 Check the quality of the joints with the help of instruments
		D2 Correct faults
	E Finish and pack the components	E1 Remove excess metal, grind and degrease the components
		E2 Paint, label and pack the components

Example 2: Functional map of the standard for a photolithography operator (electronic assembly)

The key purpose	Major functions	Modules
Coating a silicon wafer with photo-resist	A Prepare equipment	A1 Test the input of photo-resist
		A2 Fix the wafer
		A3 Calibrate the coating equipment
	B Coat a silicon wafer with photo-resist	B1 Calculate the dosage of photo-resist
		B2 Switch on the spin
		B3 Set the working process
		B4 Coat the wafer with photo-resist
	C Test the quality if the coating	C1 Remove the wafer
		C2 Test the thickness of the photo-resist layer with the help of a microscope
	D Pass the wafer to the next operation	

Example 3: Functional map of the standard for brewing

The key purpose	Major functions	Modules
Making beer (brewing)	A Prepare the raw materials	A1 Test the quality of the malt
		A2 Split the malt
		A3 Prepare the water
	B Make the wort	B1 Load the components
		B2 Control the brewing process
		B3 Filter the wort
	C Send the wort to fermentation	C1 Pump the wort for fermentation
		C2 Add the yeast
		C3 Control the process of fermentation
	D Send to final fermentation	D1 Re-pump for final fermentation
		D2 Control the final fermentation
	E Pump the finished beer into containers for dispatch	E1 Re-pump into containers

Example 4: Functional map of the standard for milling

The key purpose	Major functions	Modules
Process grain into flour	A Prepare the grain for grinding	A1 Test the quality of the grain
		A2 Place and calibrate equipment
		A3 Choose a process for the preparation of grain
	B Control the process of grinding	B1 Determine the method of grinding down
		B2 Determine sorting regime of grinding products
		B3 Test the level of flour output and by-products
		B4 Test the quality of production
	C Pack and store finished articles	C1 Agree the weight and form of packing with customers
		C2 Portion and pack finished products
		C3 Store finished products

Example 5: Functional map of the standard for the assembly of radio-electronic products

The key purpose	Major functions	Modules
Assemble radio-electronic equipment and instruments	A Prepare the components for installation	A1 Prepare wires for installation
		A2 Prepare cables for installation
		A3 Prepare radio-electronic equipment and instruments for installation
	B Install electronic components	B1 Install components by soldering
		B2 Install components by printing method
	C Test electrical installations	C1 Test installations made on a trailing stand
		C2 Test installations with checking, controlling and measuring apparatus
	D Identify and correct defects	D1 Identify and diagnose faults
		D2 Correct faults

Modules

Modules are the smallest level of detail in the functional map. For each module, three specifications are prepared; the Employment Specification, the Learning Specification (the curriculum) and the Assessment Specification. For the purpose of this seminar only the Employment Specification was developed. This specification consists of two parts; the performance requirements (what a competent person has to be able to do) and the range (the specific technology and methods).

Example 6: Module B1 from the standard for the assembly of radio-electronic products - Install components by soldering

Performance requirements	Range
Prepare the work place, equipment and materials for work	Equipment: soldering iron, cutting pliers, pincers, round pliers, equipment for flexibility of discharges Materials: tester-flux, solder, spirit, tassels
Obtain the required radio-components, technological documentation, board	
Check the quality of the board and radio-components	
Adjust the components accurately so that they can be correctly positioned.	
Position and install radio-components on the board	Equipment: pincers, cutting pliers Methods of installation: (not completed)
Apply flux to the components to be soldered	
Solder components to the board	Equipment: tassel, soldering iron, pincers, flux
Wash the finished component	
Check the quality of the component	Testing equipment: (not completed)
Pass on the component to the next operation	

Example 7: Module A1 from the standard for milling - Test the quality of the grain

Performance requirements	Range
Prepare for work in conformity with requirements of personal hygiene and safety	
Select and obtain the appropriate technical documentation	
Prepare the testing equipment	Equipment: analytical scales, laboratory places, scalpel, drying safe, laboratory mill
Take a sample of grain, according to the State Standards requirements	
Select and plan the analysis process	

Performance requirements	Range
Analyse the sample	Methods of analysis: suspension, sorting, grinding, washing, cutting, drying Equipment: crucibles, palette-knits, scoops, metallic tins for model
Clean the work place	
Inform customers about results received	

Overarching requirements

Overarching requirements apply to all the modules in a standard. These requirements are concerned with the organisation of work, interactions with other people and responsibilities for the working and wider environment.

Example 8: Overarching requirements for the standard for the assembly of radio-electronic products

Organisational	■ use energy resource and materials with economy ■ organize your working place rationally ■ plan working activities rationally ■ solve problems and make decisions ■ maintain your own quality
Relational	■ maintain good relations with other members of a team
Environmental	■ observe the safety measures ■ observe the electrical safety measures ■ observe requirements for personal hygiene and sanitation ■ observe ecological requirements

Example 9: Overarching requirements for the standard for milling

Organisational	■ plan the rational organisation of the workplace and the use of time ■ make decisions in unforeseen situations ■ notify supervisors promptly in the case of an emergency ■ make recommendations on the improvement of the technological process ■ minimise the waste of raw materials
Relational	■ support good working relations with other members of the team
Environmental	■ observe requirements of labor safety, of sanitation and hygiene, and ecological requirements on the working place ■ observe the requirements for eliminating grain explosions